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Program Evaluation Metrics for U.S. Army Lifelong Learning Centers

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14. ABSTRACT *(Maximum 200 words)*:
Lifelong Learning Centers (LLCs) comprise a suite of technologies that enable online posting of schoolhouse curricula and collaboration among distributed learners. These technologies connect the field Army to Army schoolhouses, simultaneously improving course currency and supporting training in the field. The impact of lifelong learning on organizational excellence seems clear. However, it is unknown how LLCs promote readiness using educational technology and how LLC effectiveness should be measured. The purpose of this research was to develop a comprehensive, generalizable framework for conceptualizing the effectiveness of LLCs and for capturing the drivers of success. The framework and associated metrics were used to conduct an evaluation of a pilot LLC located at Fort Leavenworth. This evaluation indicated the importance of taking a causal approach. An assessment of outcomes alone would have indicated that the initiative had achieved its goals but would have obscured the fact that some of these goals--teaching and learning effectiveness--were achieved largely independently of the use of learning technologies. The basis of the framework in theory makes it generalizable not only across current and future LLCs, but also across other blended learning initiatives, addressing a gap in the scholarly literature regarding the effectiveness assessment of educational technology.

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Program Evaluation Metrics for U.S. Army Lifelong Learning Centers

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PROGRAM EVALUATION METRICS FOR U.S. ARMY LIFELONG LEARNING CENTERS

EXECUTIVE SUMMARY

Research Requirement:

The same factors that create a greater need for Soldiers and leaders to have education and training that will help them to learn and adapt quickly--e.g., frequent tours of duty and rapidly changing equipment and technology requirements--make it more difficult for Soldiers and leaders to receive the instruction they need via the traditional Army education system. The lifelong learning concept, launched by the U.S. Army Signal Center, has been advanced by the U.S. Army Training and Doctrine Command as an Army-wide solution to this problem. Lifelong Learning Centers (LLCs) comprise a suite of technologies that enable, among other things, online posting of schoolhouse curriculum materials and synchronous and asynchronous collaboration among students, instructors, curriculum developers, and other users. These technologies connect the field Army to Army schoolhouses, simultaneously improving course currency and supporting training in the field through just-in-time reachback to the institution.

The impact of lifelong learning on organizational excellence appears clear--mission readiness will be enhanced over the short and long term, with obvious implications for operational success. What is less well understood is how LLCs promote readiness through the use of educational technology and how the effectiveness of LLCs should be captured. The purpose of the present investigation was to research and develop a comprehensive, generalizable framework for conceptualizing the effectiveness of LLCs in enhancing learning and readiness and for capturing the drivers of LLC success. The goal was to produce an assessment framework and associated metrics that would be applicable, with minor modification, across current and future LLCs.

Procedure:

Through a combination of scholarly and technical literature review and face-to-face interviews, phone conversations, and email exchanges with key stakeholders, an assessment framework based on the logic modeling (or causal) approach and blended learning theory was produced. The framework and associated metrics developed were used to conduct a formative evaluation of an LLC currently being piloted at the Fort Leavenworth Command and General Staff College.

Findings:

The assessment framework proved to be a useful tool for capturing and representing the functioning of blended learning initiatives such as LLCs, from the acquisition and use of resources to the achievement of organizational impact. Furthermore, a review of the assessment framework by key stakeholders from each of the pilot LLCs ensured generalizability across the different initiatives. The findings of the Fort Leavenworth evaluation indicated the importance of taking a causal approach. An assessment of outcomes alone would have indicated that the

initiative had achieved its goals but would have obscured the fact that a subset of these goals--teaching and learning effectiveness--was achieved largely independently of the use of blended learning technologies.

Utilization and Dissemination of Findings:

The assessment and evaluation of LLC effectiveness is necessary to justify continued investment in lifelong learning. Moreover, the optimal time to begin assessing LLCs is now, during the initial stages of their implementation. A causal assessment framework such as the one researched and developed in the present evaluation verifies whether the apparent success of an LLC is truly driven by the activities and outputs generated by the initiative. It also provides clear recommendations for bridging gaps between resources, personnel activities, system outputs, and outcomes in order to enhance impact. The basis of this framework in the theory of adult learning and blended learning methodology makes it generalizable not only across current and future LLCs, but also across blended learning initiatives more generally, addressing a gap in the scholarly literature with regard to the effectiveness assessment of educational technology.

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INTRODUCTION

The U.S. Army's contemporary operating environment is characterized by frequent tours of duty, heavy reliance on the Reserves and the National Guard, the introduction of new equipment and technology immediately prior to and during deployment, and a volatile global political situation. All of these factors result in a greater need for Soldiers and leaders to obtain the education and training that will help them to learn rapidly and adapt quickly. Yet these same conditions also make it more difficult for Soldiers and leaders to receive the instruction they need via the traditional Army education system.

The lifelong learning concept, launched by the U.S. Army Signal Center's University of Information Technology, has been advanced by the U.S. Army Training and Doctrine Command (TRADOC) as an Army-wide solution to this problem (TRADOC, 2004). Lifelong learning has been defined as "the ability of Soldiers to learn, grow and achieve technically and tactically throughout their career, wherever they serve... It's a mixture of traditional schoolhouse resident education with education presented in other locations at the individual's teachable moment" (TRADOC, 2004). Lifelong Learning Centers (LLCs) comprise a suite of technologies that enable, among other things, online posting of schoolhouse curriculum materials, synchronous and asynchronous collaboration among students, instructors, curriculum developers, and other users, and single-source course administration and learning management. These technologies connect the field Army to Army schoolhouses, simultaneously improving course currency and supporting training in the field through just-in-time reachback capability. Two LLCs, in addition to the University of Information Technology, currently are being piloted at Forts Leavenworth and Leonard Wood, with future LLCs envisioned at the other TRADOC installations.

The impact of lifelong learning on organizational excellence seems clear--mission readiness should be enhanced over the short and intermediate term, with obvious implications for operational success. Over the long term, lifelong learning should foster a cultural shift in the Army toward collaboration, information sharing, and knowledge management. What is less well understood is how the enablers of lifelong learning, LLCs, promote readiness and cultural shift through the use of educational technology and how the effectiveness of LLCs should be captured. Various approaches to assessing the costs and benefits of technology-assisted learning have been advanced (e.g., Cukier, 1997; Ehrmann, 1994; Whalen & Wright, 1999), but none have provided the complete picture of blended learning effectiveness required to diagnose problems and make specific recommendations for change. For example, where assessment approaches were explicitly specified, they often targeted either the cost or benefit of an educational initiative, but not both (Cukier, 1997). Some assessment approaches have emphasized a systems approach to conceptualizing an educational initiative (as opposed to recognizing strictly its outcomes), but yet have excluded some components of the system that drive effectiveness (e.g., Ehrmann, 1994).

Assessment and evaluation of LLC effectiveness is necessary to justify continued investment in lifelong learning. Moreover, the optimal time to begin assessing LLCs is now, during the initial stages of their implementation (Clark, 1994; Sims, Dobbs, & Hand, 2002). The purpose of the present investigation was to research and develop a comprehensive, generalizable framework for conceptualizing the effectiveness of LLCs in enhancing learning and readiness

and for capturing the drivers of LLC success. The goal was to produce an assessment framework and associated metrics that would be applicable, with minor modification, across current and future LLCs. The framework and metrics developed in this research were used to conduct a formative evaluation of the Fort Leavenworth pilot LLC. The results of this evaluation provide guidance for the establishment and implementation of future LLCs.

WHAT TO EVALUATE? OVERVIEW OF THE APPROACH

Educational program evaluation primarily informs two decisions: (1) whether to continue funding for a particular initiative; and (2) where to invest resources (i.e., money, people, and/or technology, equipment, and supplies) in order to facilitate an ongoing initiative's effectiveness (Champagne & Wisher, 2000). To support decision-making in the former situation, the evaluation must assess program outcomes relative to program goals. In the latter case, the evaluation not only must assess goal achievement; it also must capture the causal factors driving the assessment results. Evaluation of a program's drivers of success--in addition to its impact--tells a story about program functioning and identifies candidate causes for shortfalls in effectiveness and providing the leverage for change (see Cianciolo, Heiden, & Prevou, 2006; McLaughlin & Jordan, 2004).

This second type of effectiveness evaluation also is helpful for making go/no-go funding decisions for an initiative that shows mixed goal attainment. Equipped with a story that links program outcomes to causal factors, decision makers can determine whether continued funding will address impact shortfalls or whether organizational resources are best invested elsewhere. It is realistic to expect that most, if not all, educational program evaluations will produce mixed results with regard to educational impact, especially evaluations of programs in the pilot stage of implementation.

Because an evaluation approach that captures both effects and causes is more (a) informative for diagnosing impact shortfalls; (b) flexible in its support of decision making; and (c) robust to the stage of implementation to which it is applied, this type of approach was selected as the basis for the LLC evaluation framework developed in the present investigation. Background research, conducted to inform the overall design of the framework, focused on the scholarly and professional literature exploring the impact of educational technology. Assessment frameworks that were implicit (e.g., tacit assumptions guiding quasi-experimental studies) or explicit (e.g., formal theories) were considered.

Background – Evaluation Studies Measuring Effects

Interest in evaluating the effectiveness of educational technology is not new. Technology-assisted education has been examined extensively for its cost-effectiveness and learning impact at least since the 1970s (e.g., Clark, 1994; Cukier, 1997; Levin, 1986; Russell, 1999). In much of the scholarly and technical research, which focused on comparing traditional and technological solutions, decisions regarding what to measure often had an implicit or empirical basis (i.e., as opposed to being theory- or model-based). In addition, these studies were characterized by a singular focus on effects, or outcomes, such as learning achievement and/or cost savings [occasionally also time savings, as in Sanders and Burnside (2001)].

Effectiveness Conceptualized as Learning Achievement

The majority of research exploring the effectiveness of technology-supported instruction has used a quasi-experimental design to compare the achievement of students enrolled in a course using a specific educational technology against students enrolled in the same course using more traditional means of curriculum delivery (e.g., Barry & Runyan, 1995; Gifford, 1998; Keene & Cary, 1992; Hiltz, 1990; McIsaac, Blocher, Mahes, & Vrasidas, 1999; Sanders & Burnside, 2001). Learning effectiveness was demonstrated if students using educational technology performed as well or better than students completing the course of study using traditional means.

The measures of learning achievement used in these studies generally corresponded to the first, or affective, level of Kirkpatrick's (1994) four levels of evaluation. That is, surveys or interviews were used to capture students' reactions to/satisfaction with the course they took, including their perceptions of how much they learned or how beneficial they thought the course was. Several of the studies also compared student achievement using Level-2 measures--measures of actual learning. Investigators either used existing course assessment materials or they developed special purpose measures related to course content, such as mastery tests (e.g., Hiltz, 1990).

The large body of research demonstrating that technology can have a positive (or no negative) effect on Level-1 and Level-2 measures of academic achievement generally is taken as evidence that technology-assisted education is effective. A primary limitation of this research, however, is that it cannot explain *why* technology enables effective learning or *when* and *how* to use technology to achieve a specific learning outcome (Lockee, Burton, & Cross, 1999). Indeed, many scholars argue that effective technology-assisted learning has little to do with technology, but instead is critically dependent on how technology is adaptively and selectively applied to achieving particular learning objectives (Clark, 1994; Defense Technical Information Center, 2000; Ehrmann, 1994; Firdyiwek, 1999; Hannafin & Land, 1997; Owston, 1997; Willis, 2000). This possibility could account for the fact that some comparison studies show mixed or even negative effects of using educational technology. Understanding the why, when, and how of effective technology-assisted education is necessary for understanding the drivers of instructional delivery and diagnosing effectiveness shortfalls.

The impact of technology-assisted instruction beyond the educational setting [i.e., Kirkpatrick's (1994) third and fourth levels of evaluation] has not been addressed by most empirical studies. Relatively little has been done to measure behavior change systematically once students enter or re-enter non-school settings. Organizational indicators of success influenced by technology-assisted education of the workforce also remain relatively unexplored (though see Cianciolo et al., 2006 for an exception). This gap likely is the result of the difficulty of obtaining job performance data and organizational measures of success, although some educational program evaluations focus exclusively on organizational indicators of success, such as return on investment and cost savings.

Effectiveness Conceptualized as Cost Savings

Proponents of technology-supported instruction, especially distance education, claim that the introduction of educational technology will produce a significant cost savings through reduced faculty and administrative staff expenses, reduced materials production, storage, and/or shipping costs, and reduced travel and student housing expenses. Even though the fixed costs associated with procuring instructional technology are greater, variable costs tend to be lower when fewer instructors and printed course materials are required, for example if course duration is compressed (see, e.g., Whalen & Wright, 1999). Although the literature on cost accounting for technology-assisted education is quite diffuse, nearly all authors argue that when conducting such cost studies, all relevant expenses must be accounted for, including not simply the cost of the technology, but the cost to prepare, deliver, and support the course (Clark, 1994; Levin, 1986; Morgan, 2000).

Relative to the amount of discussion on the cost of technology-supported education, few published studies have been conducted that actually calculate the cost savings enabled by technology-supported instruction. One exception is the work of Phelps, Ashworth, and Hahn (1991), who compared the cost of delivering the U.S. Army Engineer Officer Advanced Course via asynchronous computer conferencing to the cost of delivering the same course in the schoolhouse. The cost categories they included were course production (based on estimated time values and hourly rates for courseware production), equipment, training, supplies, and operations and support. Whalen and Wright (1999) calculated projected cost differences between five different course delivery methods (five technology-supported and one traditional), using a detailed methodology that included the full-range of fixed and variable costs associated with course production and delivery. Their approach enabled the replicable cost comparison of different applications of instructional technology and did not require readers to assume that different types of technology have equivalent implications for cost relative to traditional instruction.

Discussions and analyses of cost savings generally focus solely on models and methods for cost accounting and rarely also discuss educational benefits (Cukier, 1997; though see Phelps et al., 1991, for an exception). Cost accounting in education is an extremely complex topic and assessment of cost savings requires a different type of expertise than assessment of learning outcomes, so perhaps for these reasons it is not coupled with educational measurement. However, assessing financial and learning impact within the same evaluation would enable decision makers to make informed judgments about cost-benefit tradeoffs (Cukier, 1997). The increased costs associated with technology-based course delivery may be worth the expense if educational objectives and/or learning audiences previously beyond reach could be obtained.

Background – Evaluation Models Addressing Causes and Effects

Several scholars recognize that multiple factors, such as individual learner and/or instructor readiness, technology usability, curriculum quality, and organizational support for continuous learning, play a role in the effectiveness of an educational or training solution (e.g., Dean, Biner, & Coenen, 1996; Salas, Rhodenizer, & Bowers, 2000). There is informal recognition or listing of these factors [e.g., Defense Technical Information Center (DTIC), 2000;

Willis, 2000] and there exists a handful of formal models for assessing these factors as they relate to the success of technology-assisted education (see, e.g., Belanger & Jordan, 2000; Ehrmann, 1994; Harrison, Seeman, Behm, Saba, Molise, & Williams, 1991).

For example, Harrison et al. (1991) identified, through a combination of literature review and interviews, four categories to assess when evaluating distance education: (1) instruction (e.g., student-instructor interaction); (2) management (e.g., technical support and planning); (3) telecommuting (largely the unique features of distance education); and (4) support (e.g., organizational support for the program). Harrison et al. used these categories to construct an 89-item course evaluation survey, which was then validated in an experimental study. Scale scores for each of the four categories were moderately correlated, even in the context of satisfactory to high scale reliabilities, suggesting that the categories, while not unique, were distinguishable. However, the researchers only examined the possible factors influencing distance learning and did not attempt to capture the learning outcomes associated with the course evaluated in the study.

Ehrmann (1994) described the planning effort behind the Flashlight Project, which was intended to produce generalizable, targeted, and validated methods for evaluating technology-assisted higher education. In this planning effort, Ehrmann identified the targets for assessment, advocating a combined process-outcome approach. The outcomes he identified were learning effectiveness, enrollment and retention, and cost control. Among the processes Ehrmann identified were teaching-learning strategies especially relevant to technology-supported instruction and faculty roles and attitudes towards instructional technology. Ehrmann argued that improvements in learning outcomes, access, and costs on a departmental and/or institutional scale required changes in teaching practices and learning environments, which in turn required changes in institutional patterns of technology use.

The previously described research exploring the effectiveness of technology-assisted education provides a firm foundation for developing metrics to assess the learning effectiveness and organizational impact of Army LLCs. One could conclude from this body of work that (a) it is important to use multiple levels of analysis to conceptualize educational outcomes; (b) cost metrics should capture the full cost of technology-supported instruction, not just hardware and software expenses; (c) cost effectiveness metrics should enable the concurrent review of costs and benefits; and (d) factors leading to educational outcomes, such as organizational support and technology usability and access, should be measured in order to fully understand the learning effectiveness of technology-assisted education.

What the previously described research cannot do is provide a comprehensive theory or framework for conceptualizing how Army LLCs achieves educational and organizational impact through the introduction of blended learning (i.e., combined face-to-face, individual, asynchronous collaborative and synchronous collaborative learning) solutions. An in-depth application of the cause-effect (or causal) approach to understanding educational impact must occur. Such an application would extend previous research by integrating multiple perspectives on the drivers and indicators of blended learning effectiveness and by specifying the means by which blended learning has an impact on organizational measures of success through behavior change.

A Way Forward: The Logic Modeling Approach

Logic modeling is a tool for conceptualizing how a program transforms resources (e.g., funding, personnel, etc.) into external results through activities, output, and multiple levels of outcomes. McLaughlin and Jordan (2004) describe the logic model as a "useful advance organizer for designing evaluation and performance measurement" (p. 7). A logic model makes explicit the often tacitly understood functioning of a program, revealing the possibilities for evaluation and the targets for assessment and providing a systematic means to approach the cause-and-effect evaluation of program functioning. Building a logic model is analogous to conducting a terrain analysis; it reveals the areas that must be captured (i.e., assessed) in order to achieve strategic success (i.e., maximally informing decision making) with a program evaluation.

Logic models are especially useful for planning the effectiveness evaluation of programs not easily associated with traditional return-on-investment metrics, but whose continued funding depends on demonstrations of impact (Cianciolo & Prevou, 2006; McLaughlin & Jordan, 2004). The use of logic models does not preclude a cost-effectiveness evaluation, but rather provides a way to consider cost and benefits together as interrelated characteristics of the same initiative. Logic models also prevent the focus of evaluation from becoming too narrowed on a particular aspect of a program, such as outcomes--which cannot be used to diagnose problems--and activities--which are easy to measure but meaningless when disassociated from outcomes. The logic model approach used in the present evaluation therefore represents an extension of the work reviewed above by (a) integrating multiple previous assessment approaches into a unified, systematic approach; (b) capturing multiple levels of outcome, to include organizational impact; and (c) assessing both cost- and learning-effectiveness in the same study.

BUILDING THE LOGIC MODEL FOR LLC EVALUATION

A variety of resources were used to build the logic model of LLC impact. The construction process began with a review of the planning and communications documentation prepared by the directors of the three pilot lifelong learning initiatives. This documentation included the LLC master plan, operational requirements statement, use case summaries, draft metrics for each lifelong learning initiative, and implementation progress presentations. Review of this documentation identified the core structure of the LLCs--their technical and staffing components--as well as the envisioned impact of the LLCs on Army education and training, operational performance, and organizational success. Phone conversations, face-to-face interviews, and/or video teleconferences were conducted with the director of each of the three initiatives to gather their explanations of how the technology comprising the LLCs would lead to the envisioned organizational impact through enhanced learning and behavior change. In addition, phone conversations and face-to-face discussions with key LLC personnel were conducted in order to identify the activities of each and their expected contribution to LLC functioning. This component of the logic model construction process ensured a thorough, concrete understanding of the lifelong learning initiative as envisioned by the Army and implemented by the individual pilot schools.

Concurrently, an extensive review of the scholarly and professional literature on technology-assisted learning was conducted, with a special emphasis on theory and best practice in blended learning. The literature review covered a broad range of topics, including (a) the anticipated behavioral outcomes of learning in a technology-supported environment; (b) the social impact of including technology, especially networked computers, in the learning process; and (c) the instructor, student, and organizational determinants of effective learning. A review of the military technical and professional literature was conducted to more fully understand concretely such organizational outcomes of interest to the Army as mission readiness and culture shift. This component of the logic model construction process fleshed out the information gathered from the LLC planning and communications documentation and interviews with LLC leadership and staff. It helped to make explicit the link between technology and organizational impact that often is implicit in discussions of technology-assisted learning in the Army (e.g., Freeman, 2003).

Finally, face-to-face interviews and focus groups were conducted with curriculum developers, instructors, and students at the Command and General Staff School at Fort Leavenworth. The intent of these conversations was to capture the modifications that must be made to the general logic model in order to make it applicable to the Leavenworth lifelong learning initiative in particular, which was assessed as part of the present investigation.

The LLC Logic Model

This section presents a detailed overview of the logic model developed for the present research and depicted in Figure 1 below. The following description of each component of the model--resources, activities, outputs, and outcomes--is coupled with the justification of its inclusion in the model.

Resources

The resources briefly described below represent the categories of resources typically found in the logic models of other programs (McLaughlin & Jordan, 2004). Of importance is the support these resources provide to executing the program activities. Tracking critical resources makes it possible for evaluators to inform decisions regarding resource allocation within a program by linking resources to outcomes through activity and output.

Money. Best practice in cost accounting for higher education indicates that there are three broad categories of expense: (1) personnel, supplies, and other costs **directly attributable** to course development and delivery (e.g., instructor salaries and benefits); (2) personnel, supplies, and other costs **indirectly attributable** to course development and delivery (e.g., salaries and benefits for technical support personnel and administrative staff); and (3) costs associated with **facilities and equipment use** (e.g., heating and electricity) (Hyatt, 1983; Middaugh, 2000). All financial resources associated with producing, administering, and supporting a course should be accounted for, especially for technology-assisted courses in which the temptation is to limit cost accounting to technology requirements (Clark, 1994; Levin, 1986).

Personnel. In addition to the LLC leadership and the technical staff, the LLC planning documentation (*LLC Operational Requirements*, 2005) lists several other key personnel types involved in lifelong learning. These key personnel types include training developers, subject matter experts, instructors, course managers, and doctrine developers as well as others who benefit from the program, that is, students and general purpose users. In the present investigaiton, the personnel of particular focus were the **technical staff** and the **leadership**, for their critical role in the online presence of the LLC, and the **instructors** and training developers (i.e., **curriculum developers** and **CBT/WBT courseware production teams**), for their critical role in providing

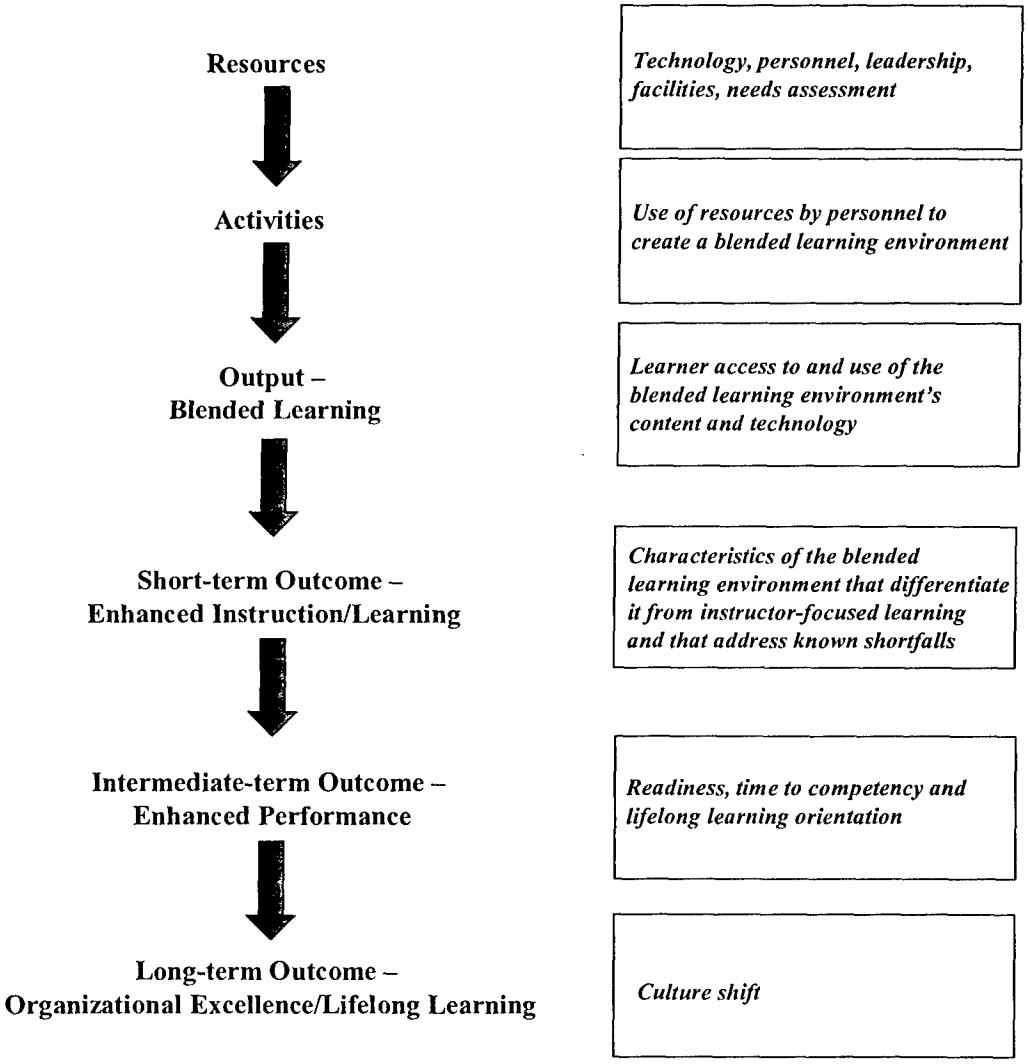

Figure 1. Logic Model for Army LLC Impact

learning content. Most of the other personnel were excluded in the present research in an effort to balance the current and future instantiations of the LLC. These excluded personnel roles represent envisioned users, so explicating their role in the initiative would have been somewhat speculative and subject to change. Students and general purpose users were not included in

personnel because their primary role was considered to be more analogous to a consumer than a producer in the program.

Technology, equipment, and supplies. The technology, equipment, and supplies for the LLC include the hardware, software, and network connections necessary to create and sustain the online presence of the initiative, but potentially also go beyond the technical footprint to include equipment for students or other users and office supplies for personnel.

Logic models may include additional resources in order to capture program inputs that are not conventionally considered requirements but nevertheless are critical to program success (McLaughlin & Jordan, 2004). Chief among these resources is a needs assessment. The needs assessment states in concrete detail the purpose of the program--the problems it will solve, performance or behavioral shortfalls it will address, and/or the ways in which it will extend organizational success. The needs assessment also explains why the program is the best solution. Importantly, the needs assessment provides the focus for program activities, aligning them with the envisioned outcomes and expected impact of the initiative (Cianciolo et al., 2006).

Activities

The activities of the LLC's technical staff, curriculum developers, instructors, courseware production teams, and leadership collectively produce the main output of the initiative--anytime, anywhere access to Army schoolhouse curriculum content. The tasks these types of personnel execute were determined in part by review of the LLC planning documentation, interviews with LLC personnel, and, where necessary, literature review.

Technical staff. The technical staff is the critical interface between LLC users and the educational technology. As such, the technical staff first ensures that the system is accessible by performing the **setup, integration, customization, and management of LLC components** and **migrating course content across LLC components** (e.g., from Sharepoint to Bb). Secondly, the technical staff fosters the effective use of the educational technology by **providing training to instructors, curriculum developers, and other users on the LLC components** (see also DTIC, 2000). This training not only should include instruction on the basic system functions but also on the standard operating procedures that have been developed in the schoolhouse to leverage the system capabilities. A third key function of the technical staff is to **provide technical support to students, faculty, curriculum developers, and other users**, assisting with enrollment, usability problems, and other inquiries (e.g., password changes). In serving this function, the technical staff also **provides support for answering Field Army users' operational questions**, either by contacting a relevant, local subject matter expert or by facilitating a connection between users and more remote experts, such as through BCKS professional forums. The effectiveness of technical support in performing these functions is an important determinant of the success of technology-assisted education (DTIC, 2000; Willis, 2000)

Curriculum developers. The fundamental role of the curriculum developer is to populate the LLC with engaging, effective, and relevant course content. In order to enhance teaching and learning through the development of more relevant curriculum materials, developers must

leverage the capabilities of the LLCs to **collaboratively generate course content**, even when geographically distributed. Such collaboration ensures that curriculum materials are integrated and build on one another to reinforce key learning objectives. Curriculum developers also must **update course content based on feedback from instructors and students**, for example by leveraging access to Army Knowledge Management resources (e.g., BCKS, Center for Army Lessons Learned). Importantly, early adopters of the LLCs' educational technology must **lead the development of standard operating procedures (SOPs) for leveraging the capabilities of the LLC components**. As with any digital system with multiple users, shared awareness of how information is organized is critical to collaboration, and effective procedures for building this shared awareness must come from the collaborators themselves. Early adopters also must **mentor late adopters on system functionalities to enhance course development** (Willis, 2000). Late adopters may be curriculum developers who are initially resistant to using the system or who are newly hired and therefore unfamiliar with the collaborative technologies their peers are using. Both the presence of SOPs and formal mentorship among curriculum developers represent well-recognized and Army-endorsed knowledge management practices for enhancing performance.

Instructors. Instructors ensure that students and other users of the LLC participate in an educational experience that leverages the unique capabilities of blended learning systems. For example, instructors must **deliver curriculum materials by posting them in the LLC**. Although curriculum developers and the technical staff are responsible for creating and migrating course content, instructor updates posted in the LLC ensure that content is (a) accessible to all users of the LLC (with the appropriate permissions); and (b) relieved of the limitations associated with a lengthy curriculum development and review process. Other means for delivering curriculum updates, such as print or email, prevent the achievement of some key goals of the system, such as cost-effectiveness and uniform access. Instructors may **customize course content based on student feedback** by leveraging the easy access to Army knowledge management and other resources that the LLC provides. Instructors also should use the system to **perform course administrative duties**, which preserves classroom time for actual learning (Bourne, 1998). Instructors also may leverage system capabilities to **evaluate student progress and report grades to school administrators**. Creative use of the LLC components to evaluate student progress may involve such activities as asynchronous discussions and distributed presentations and collective exercises (Bonk & Cummings, 1998). Finally, early adopters of the LLC components should **lead the development of SOPs for leveraging the system capabilities** (e.g., collaborative capabilities in Bb) and **mentor late adopters on application functionalities to enhance course instruction**. As with curriculum developers, late-adopting instructors may be those who initially resist system use or who are new to the faculty. Such knowledge management practices would ensure that best practice is internalized and disseminated.

CBT/WBT courseware production team. The CBT/WBT courseware production team, when present, must ensure that CBT/WBT courseware delivered via the LLC is reliable, instructionally sound, efficiently delivered, and cost-effective. To do this, **project teams must be maintained to perform CBT/WBT analysis, design, development, implementation, maintenance, and validation**. The maintenance of these project teams ensures that specialists are allocated to each component of the development process. That is, instructional designers/analysts are assigned to designing and validating course content as well as overseeing

the course generation process. Programmers ensure the effective implementation and technical support of the courseware and media specialists enable engaging multimedia presentation of course content. The courseware production team also **provides contractual, technical, and educational/quality oversight of contractor-developed CBT/WBT**. Where the demand for distance-learning courseware is too great for the in-house team, it nevertheless must assist in maintaining the quality and efficiency of the development process through consultation and support. Finally, the courseware production team must **maintain a database of CBT/WBT technologies, capabilities, and techniques** in order to leverage the latest knowledge and best practice in multimedia instruction. The presence of such a database ensures that all members of the team have access to the knowledge they need to make the courseware as effective as possible.

Leadership. The LLC leadership is key to ensuring that all stakeholders are maximally engaged and that through their coordinated activity the initiative reaches its goals. To facilitate the coordinated activity of the other LLC personnel, the leadership must **provide the vision** that serves as a shared objective for all involved. The vision should be based on a **user and stakeholder needs assessment** that maximally aligns the goals of the initiative with the interests and needs of the people involved and with the Army's organizational mission (Cianciolo et al., 2006; DTIC, 2000; Thach, 1993). The leadership must then **communicate the vision** and **market the LLC concept to stakeholders** (*LLC Master Plan*, 2005; Willis, 2000). Stakeholders include curriculum developers, instructors, courseware developers, technical staff, students, and the operational Army because each of these individuals are affected by the introduction of a new learning initiative and their buy-in and personal investment are critical determinants of its success. To ensure the effective functioning of the LLC, the leadership must **procure resources to maintain/update the LLC, oversee operations, prioritize limited resources across LLC functions**, and **initiate/organize the development of SOPs for leveraging the system capabilities**. Although SOPs must ultimately come from the personnel who use the LLC components, leadership is necessary to guarantee that the task of SOP development is taken on and that the key individuals are involved who can facilitate the process and ensure SOP adoption.

Output

24/7 uniform access. Explicit throughout the *LLC Master Plan* (March, 2005) is the vision that the teaching and learning environment will be improved via integrating resident and distance-based training and education into a blended, seamless process that enables standardized instruction anytime, anywhere. As stated in the planning documentation, the main output of the LLC then is "relevant, standardized training and education, on demand, to the right Soldier, leader, or unit, at the teachable moment, regardless of location" (p. 1). LLC output may be conceptualized both as **access to the system** (i.e., the system truly is available 24/7 to all members of a diverse user population) and **actual use of the system** by students and other users. Use of an accessible system is necessary to achieve the intended educational and organizational impact of the initiative, and to link the activities of personnel to these outcomes.

Computer-/Web-based courseware for conducting proponent courses. Unique to the Fort Leonard Wood LLC is the presence of a CBT/WBT courseware production team, which comprises instructional designers, programmers, and media specialists who collectively perform

CBT/WBT analysis, design, development, implementation, maintenance, and validation for instructors. The output of this team should be **courseware that is readily available to meet course needs**. That is, the courseware should be reliably playable in Distance Learning XXI classrooms, digital training facilities, and any other location by which distance education is accessed. If the courseware is not accessible, it cannot achieve enhanced instruction and learning, no matter how educationally sound and engaging it is. The courseware also should feature the same range in content that is found in the courses that are delivered via distance education.

Outcomes (Short-, Intermediate-, and Long-term)

LLCs are expected to have a wide set of outcomes, ranging from short-term impact on the learning and education process, to long-term impact on organizational culture. Intermediate-term impact on individual learners is believed to link short- and long-term outcomes as more learners use the LLCs more often to achieve lifelong learning. Each outcome component of the LLC logic model described below was defined and justified according to (1) explicitly stated goals for the LLC initiative; (2) implicitly recognized changes that the LLC could produce in learning and performance; and (3) theoretical outcomes expected from blended learning environments.

Short-term Outcome – Improved teaching and learning environment. The LLC planning documentation (*LLC Operational Requirements*, December 2005) states that one high-level goal of the initiative is an "improved teaching and learning environment." The temptation to define "improved teaching and learning environment" in terms of the advanced technological capabilities that constitute LLCs is reflected in some of the initial metrics drafted by LLC stakeholders, which target largely the technical functioning of the initiatives. However, defining improvements in this way confounds technology with its intended educational effect. This precludes the specification of the link between technology and intermediate-term LLC outcomes, such as improved student performance, enhanced readiness, and the like. Identifying how LLCs achieve improvements to the teaching and learning environment must answer the question "What necessary changes to teaching and learning can be brought about by the implementation of a blended learning environment?" Metrics associated with this outcome must capture whether the changes are indeed occurring.

Discussions with LLC directors and other stakeholders revealed that the LLCs could enable several improvements to the teaching and learning environment. Chief among these improvements is **enhanced relevance of training and educational content**, that is, the correspondence of training and educational content to the demands of the operational environment. LLCs are thought to enhance relevance primarily in two ways. First, LLCs connect the institutional Army to the operational Army through centralized access to the Battle Command Knowledge System Leader Network and numerous other online discussion forums. This connection is believed to reduce the time required to incorporate operational lessons learned into course content because input comes directly from the field rather than through a lengthy institutional review and vetting process. Second, the online presence of LLCs eliminates the requirement to replicate and ship training and educational materials to students or other learners who are not located at the schoolhouse. Replication and shipping can add a significant time delay to distributing instructional materials (sometimes up to a year), expanding the gap between learning content and the reality of the operational environment. Increased correspondence

between training and educational content and the operational environment may also be achieved through the timing of instructional delivery. In some contexts, just-in-time instruction may be thought of as more relevant than "just-in-case" instruction, although formal education must strike a balance between these endeavors.

Discussions with the director and staff of the Fort Leonard Wood LLC revealed that their LLC specifically addresses the limited expertise instructors may have in producing courseware for computer-based training (CBT) and/or web-based training (WBT) for distance learning. The Fort Leonard Wood LLC is unique among the LLCs in having an in-house courseware production team that comprises instructional designers, programmers, and media specialists who collectively perform CBT/WBT analysis, design, development, implementation, maintenance, and validation for instructors. This courseware development team improves the teaching and learning environment by enabling the delivery of more **advanced CBT/WBT courseware for distributed/distance learning** that is educationally sound and compliant with Army training regulations. Specifically, educationally sound courseware should meet rigorous, independently derived criteria for content, instructional activities, performance assessment and feedback, and usability (Hays, Stout, and Ryan-Jones, 2005). Therefore, the delivery of CBT/WBT courseware produced by specialists may enhance the teaching and learning environment by obviating individual differences in instructor capability to produce engaging, effective, and usable courseware.

Review of the scholarly literature indicated that there are several ways by which introducing blended learning to the instructional process may improve both teaching and learning. The most commonly cited improvement is the emergence of a learning experience in which the **instructor acts as a facilitator of adult learning**, fostering knowledge-seeking and knowledge-generation in his or her students through wide-ranging access to resources, people, and information. As stated in Firdyiwek (1999), "the pedagogy of online instruction is based on the effective use of electronic learning environments for the development of cognitive skills through access to information, interactivity with tools, and communication" (p. 29). There is general agreement in the literature (e.g., Abell, 2003; American Distance Education Consortium, 2003; Bonk & Cummings, 1998; Bonk & Reynolds, 1997; Chickering & Gamson, 1987; Herrington, Herrington, Oliver, Stoney, & Willis, 2001; Mason, 1991; McLoughlin & Oliver, 1999; University of Illinois, Urbana-Champaign, 1999) that the following instructor behaviors reflect facilitation of adult learning and effective use of educational technology:

- Provides clear guidance on expectations and evaluation criteria
- Provides positive and informative feedback
- Provides challenges to students without overwhelming them
- Assigns group tasks and roles within group tasks
- Involves students in generating course material
- Facilitates analysis and reflection through questioning
- Encourages students to use resources (including other experts) outside the classroom for research and learning

These behaviors are applicable to any classroom, traditional or otherwise (e.g., Abell, 2000), but they are especially important in distributed learning situations in which students lack

the social cues and interpersonal connections they receive in face-to-face settings (Hiltz, 1998; Kreijns, Kirschner, Jochems, 2003). Failure to leverage the technological capabilities present in blended learning solutions may *reduce* the educational effectiveness of instruction relative to traditional classrooms by creating confusion, frustration with the learning experience, and social distance.

For students learning synchronously in a classroom setting (traditional or virtual), **enhanced instructor efficiency** is another improvement to the teaching and learning environment enabled by blended learning solutions. A wide range of scholars and practitioners agree [e.g., Clark, 1994; Defense Technical Information Center (DTIC), 2000; Ehrmann, 1994; Firdyiwek, 1999; Hannafin & Land, 1997; Owston, 1997; Willis, 2000] that the long-range impact of technology on learning is a function of the degree to which the technology is leveraged to support change in the learning process. Such change is partly enabled when instructors use the administrative functions of instructional technologies to protect valuable classroom learning time from administrative interruptions (Bourne, 1998). Instructors enhance classroom efficiency by using asynchronous collaborative tools to prepare students for class discussions, to make announcements, to collect homework, to administer exams, and so on. The "extra" available class time may then be used for more in-depth exploration or processing of ideas through discussion or practical group exercises.

The **presence of a learning community** is considered a key hallmark of an effectively facilitated adult classroom, especially one supported by blended learning technologies that enable learners to connect and share easily anytime, from anywhere. In the context of blended learning, learning communities may be defined as networks of learners who are tied to one another through the exchange of intellectual, practical, and/or social support (Haythornthwaite, 2002; Moller, 1998; Wellman, Carrington, & Hall, 1988). Learning communities characterized by strong ties between a small number of individuals enhance the teaching and learning environment by (a) providing social support critical to retention and educational success, especially for distance learners (Haythornthwaite, 2005; Kreijns et al., 2003; Sanders & Burnside, 2001); and (b) transforming the learning environment into a vehicle for organizational socialization through the growth of shared experience and values (Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994; McMillan & Chavis, 1986). Large learning communities characterized by a greater number of weak, diffuse ties--in effect communities of practice (Wenger, McDermott, & Snyder, 2002)--facilitate information sharing among diverse people and new knowledge development (Haythornthwaite, 2002; Wellman & Gulia, 1999). Learning communities are more easily formed when learners are within close proximity of one another, but ties that enable the exchange of support may be formed and maintained even at a distance (Sanders, 2002; Wellman & Gulia, 1999).

Intermediate-term outcome – Improved student performance. The *LLC Master Plan* (March, 2005) states that LLCs will "improve Soldier performance through resident training and distance learning." Referring to the 2004 fiscal year training guidance given by the Commanding General of the U.S. Army Training and Doctrine Command (TRADOC), the master plan implies that improved student performance will feature personal responsibility for learning and enhanced skill development. In theory, improved student performance results from the effective use of educational technology to revolutionize instruction and enhance the meaningfulness of course

content. Importantly, student performance in this research primarily is conceptualized in terms of general learner competencies that may be improved through the effective use of educational technology. Conceptualizing student performance in this way makes the logic model more generalizable across LLCs while capturing aspects of performance that are most closely linked to the changes in instruction brought about by LLCs.

The contemporary operating environment has placed greater demand on Soldiers and leaders to have a diverse, robust skill set that includes both individual and team-based capabilities. Diverse skill sets are required so that Army personnel can effectively carry out full-spectrum operations with daily changing mission requirements. Soldiers and leaders also must acquire and retain robust behavioral repertoires that transfer to a variety of performance environments, such as urban versus open terrain. They have precious few opportunities to train as collectives in the unit setting and so must rely on institutional training to develop the individual and team-based competences necessary for collective performance. **Enhanced skill development** therefore comprises a greater range in skill sets acquired by Soldiers and leaders, greater transfer of training to diverse performance environments, and improved collective task execution. Skill development may be enhanced via blended learning through more field-relevant instructional content, more frequent and varied training opportunities, more productive learning time due to reduced administration in the classroom, and more frequent opportunities to participate in group learning activities (e.g., Abell, n.d.; Bonk & Reynolds, 1997; Bourne, 1998).

Enhanced learner independence and responsibility follows from effective instructor facilitation in the blended learning environment (McLoughlin & Oliver, 1999). Although generally not studied as its own subject, it may be conceptualized as one's sense of ownership of one's professional development and learning process, indicated by establishing learning goals, engaging in independent research, preparing for learning opportunities (e.g., class discussions), and maintaining regular contact with learning resources. Although the development of learner independence and responsibility is an important outcome of any learning environment, the blended learning environment is believed to enhance these characteristics by making it easier for instructors to promote increased student participation in facilitated group activities (e.g., asynchronous conferencing), learning self-management (e.g., database and/or portfolio generation), and independent research (e.g., internet searches and/or participation in online communities of practice) (McLoughlin & Oliver, 1999).

The behaviors reflecting learner independence and responsibility are tightly coupled with other learner characteristics that also are influenced by instructor effectiveness, namely **enhanced learning self-efficacy** (Abell, 2003; Gibson, 1996) and **enhanced motivation** (Abell, 2000; Cornell & Martin, 1997). Learning self-efficacy within the context of blended learning is reflected in students' perception of their ability to lead their own learning process and to achieve their learning goals using the information, people, and other resources available to them through online content and collaborative tools. One's learning self-efficacy may be negatively affected by educational technology if the technology is not usable or otherwise introduces difficulty to the learning process due, for example, to reduced performance feedback or social interaction (Abell, 2003; Gibson, 1996; Haythornthwaite, 2005; Kreijns et al., 2003). In addition to instructor effectiveness, the job-related applicability of the learning content is a well-recognized motivator of adult learners (Abell, 2000; O'Donnell, 2005). To the extent that the blended learning

environment is leveraged to enhance the relevance of course content and the performance-environment representativeness of learning activities (e.g., through simulations and collaborative activities), learner motivation can be expected to increase (Cornell & Martin, 1997).

Enhanced higher-order thinking and **enhanced reflective capability** are long-recognized student-performance goals of any educational initiative (Dewey, 1933; Garrison, 1991; Lipman, 1987; Nickerson, 1989). The introduction of blended learning technologies into the learning process does not obviate these goals, but may enhance their achievement by increasing the access students have to diverse perspectives and cognitive resources (Grotzer & Perkins, 2000; Haythornthwaite, 2002; McLoughlin & Oliver, 1999; Paul, 1987) and the time students have to engage in guided critical thinking, problem solving, and reflective practice in the classroom (Bourne, 1998; Grotzer & Perkins, 2000). Enhanced higher-order thinking and reflective capability may be captured through special purpose measures that reflect critical thinking and problem solving skills or that exercise the process of reflection.

Intermediate-term outcome – Improved individual and unit performance in the field. Highlighted in the *LLC Master Plan* (March, 2005) is the importance of supporting TRADOC's imperative to "provide Soldiers and leaders who can immediately contribute to unit readiness on the first day they arrive in their unit" (p. 5). Similarly, the Army must deploy cohesive units that can immediately contribute to mission accomplishment the day they arrive in theater. Rapid readiness is dependent in part on the retention and adaptation of skills and competencies as well as the swift acquisition of new ones. A key aspect of individual and unit performance in the field that can be influenced by LLCs, then, is **just-in-time competency**. Swift skill acquisition is enabled by anytime, anywhere access to one's proponent schoolhouse, a defining characteristic of the LLC. The retention and adaptation of skills and competencies that support just-in-time competency stems in part from the enhanced cognitive ability reflected in improved student performance, as described above, and in part from the adoption of a lifelong learning orientation, as described below.

Intermediate-term outcome – Adoption of lifelong learning orientation. The adoption of a lifelong learning orientation is a signal outcome of the LLC initiative and a critical determinant of its perpetuation. The *LLC Master Plan* (March, 2005) states: "Soldiers must perceive learning as a continuous process that must be refreshed throughout their career." Lifelong learning orientation might therefore be conceptualized as one's **distal motivation to engage in opportunities to learn**. Distal motivation is one's intent to engage in a particular task, is reflected in the goals one sets for task performance, and determines how one allocates effort across the range of possible tasks (Kanfer & Ackerman, 1989). A Soldier or leader who intends to engage in continuous learning will set goals for participation in learning opportunities and prioritize their efforts to target lifelong learning. A person's distal motivation is a function of three subjective assessments: (1) the perceived utility of performance (i.e., the desirability/payoff of the chosen goal); (2) the perceived utility of effort (i.e., one's intrinsic need to achieve); and (3) the perceived relation between one's effort and performance (e.g., as indicated in performance feedback with regard to goal achievement) (Kanfer, 1987). Put another way, people will choose to engage in opportunities to learn if they feel that lifelong learning has certain benefits, that goal achievement is worthy of effort in and of itself, and that engagement in specific lifelong learning opportunities will result in goal achievement and payoff.

The relation between a blended learning initiative and intent to engage in opportunities to learn is complicated. A blended learning initiative may not be as dominant as some organizational characteristics (e.g., promotion policy) in driving the perceived payoff of lifelong learning. In addition, external factors may play a larger role in determining people's intrinsic need for achievement than characteristics of the learning environment. However, the effectiveness of the LLCs may have a strong impact on Solders' and leaders' perception that engaging in lifelong learning will help them to achieve their professional goals, as opposed to some other activity. The integration of education and training initiatives on the one hand and personnel initiatives on the other may be the most effective way to facilitate the development of lifelong learning orientation (Moran, 2006).

Intermediate-term outcome – Enhanced mission readiness. The *LLC Operational Requirements* (December, 2005) state that the LLCs will provide "improved training and education support" to the Field Commander and deployed Army. Implicit in this statement is the goal of achieving enhanced mission readiness, an objective of particular interest to the Army. Readiness may be conceptualized in two ways: (1) as unit status [i.e., U.S. Department of the Army (DA), 2006]; and (2) as individual and team characteristics that affect unit performance (e.g., McGonigle, Casper, Meiman, Cronin, Cronin, & Harris, 2005). LLCs may have an impact on both of these aspects of readiness over both the intermediate- and long-term.

Unit readiness, as captured by unit status reports, is a function of personnel numbers, equipment availability, equipment readiness, and training status (DA, 2006). LLCs, by enabling anytime, anywhere access to standardized training materials, may be expected to **enhance unit status reporting**--specifically the reason codes associated with sub-optimal personnel and training components of unit readiness. Personnel readiness is determined by comparing the available strength, the available military occupational specialty qualified (MOSQ) strength, and the available senior grade strength to the required unit strength. Of particular relevance to LLCs that provide MOS-qualification training is the available MOSQ personnel percentage component of personnel readiness. The MOSQ personnel percentage is the ratio of available MOSQ personnel to required MOSQ personnel. It is reduced when Soldiers cannot attend MOS-qualification training when they need it. A unit's training status is determined jointly by the commander's estimate of the proportion of the mission-essential task list (METL) that has been trained to standard and the number of training days required to reach standard on METL core tasks. Training readiness estimates may be influenced by a number of factors, including personnel absences during training exercises because they do not have the required MOS-qualification training or absences due to attending MOS-qualification training at the schoolhouse. Reserve units experience great difficulty reaching optimal training status for these reasons (Sortor, Lippiatt, Polich, & Crowley, 1994). By making MOS-qualification training available anytime and anywhere, LLCs may enhance unit status reporting by reducing the number of Soldiers who are not qualified for their duty positions or who must travel to participate in qualification training.

LLCs also should **reduce the time to optimal training status** (as reflected in unit status reports) by allowing more people to complete MOS-qualification training in a timely fashion. This is because anytime, anywhere training enabled by the LLC blended learning environment is

not limited by the number of seats available in the schoolhouse (see also Freeman, 2003). Those who need MOS-qualification training can receive it just in time, rather than waiting until the schoolhouse has the space to seat them. Having MOS-qualified (MOSQ) personnel available for unit training should reduce the number of days required to reach standard on METL core tasks by improving training quality (Sortor et al., 1994).

Along these lines, LLCs may enhance **MOSQ training status**, that is, the number of individuals receiving MOS-qualification training relative to those who need it. For example, there are a great many more individuals requiring MOSQ and leader training in the reserve component than who are able to receive it through residential schooling (Winkler, Shanley, Crowley, Madison, Green, Polich, et al., 1996). LLCs may affect the proportion of individuals both requiring MOS-qualification training and receiving it by making "virtual" training seats available to anyone. The use of training seats available by the reserve component also is inefficient, but this is likely due to factors outside of the sphere of influence of LLCs (Brown, 2002).

Arguments have been made against the adequacy of unit status reporting (e.g., James, 2004; Moore, Stockfisch, Goldberg, Holroyd, Hildebrandt, 1991; Sortor et al., 1994; Winkler et al., 1996), in part because unit status reporting is subjective and because it does not capture all of the determinants of mission success (e.g., leadership quality, troop morale, and proportion of low-density/high-demand DMOSQ personnel). In addition, unit status ratings are very difficult to change for a variety of reasons (Moore et al., 1991). To the extent that there is reduced variance in unit status reports due to subjectivity or reduced external validity due to lack of content validity, the utility of unit status reports as indicators of readiness (and LLC impact on readiness) will be limited.

Behavioral theories of readiness partially address the challenges associated with unit status measures of readiness. The advantage of behavioral theories is that they lend themselves well to using psychometrically sound measures of readiness. The disadvantage of such theories is that the link between the identified readiness components and actual mission performance is not fully known[1]. Components of readiness in the psychological literature include unit cohesion, physical fitness, technical competence/job performance, organizational citizenship behavior (e.g., helping behaviors, punctuality, etc.), preparedness to deploy, and organizational commitment/retention (McGonigle et al., 2005). These components are in turn influenced by skill development, job satisfaction, family adaptation, perceived organizational support, and self/collective efficacy (McGonigle et al., 2005).

LLCs may improve readiness by **enhancing (affective) organizational commitment**. Affective organizational commitment is distinguished from other forms of commitment (normative and continuance) by its emotional characteristic (i.e., organizational members stay because they want to) and its positive relation to organizational measures of success (e.g., efficiency; McGonigle et al., 2005). LLCs may influence affective organizational commitment by buttressing users' perceptions of organizational support. As described in Chao (2006), any interaction an individual has with the organization--whether through other members of the organization, through organizational initiatives, or some other means--acts as an agent of

[1] Note this same criticism has been leveled against unit status reports (e.g., Junor, 2005; Moore et al., 1991).

organizational socialization. To the extent that LLCs convey to users that the Army is doing its best to support Soldier and leader education (i.e., by meeting learners' needs), affective commitment may be increased (Burnam, Meredith, Sherbourne, Valdez, & Vernez, 1992; Gibson & Tremble, 2006). Conversely, if the LLC fails to meet learners' needs or presents a learning environment characterized by poor usability and/or significant technical difficulty, affective commitment may be decreased as learners become cynical about the Army's ability and motivation to support their professional development (Burnam et al., 1992; Gibson & Tremble, 2006).

Along these lines, LLCs may improve readiness through **enhanced socialization in organizational goals and values**. In a five-year study of engineering, management, and other professionals, Chao et al. (1994) demonstrated that study participants who changed organizations were significantly less socialized in organizational goals and values prior to leaving their employers, suggesting a link between this form of socialization and organizational commitment. Moreover, socialization in organizational goals and values had the strongest relation among six socialization dimensions (people, politics, history, job proficiency, language, and organizational goals and values) to career involvement and job satisfaction and accounted for significant variance in these variables above and beyond job tenure and organizational tenure. Through effective instructor facilitation of distance learning and the development of learning communities, LLCs contribute to this socialization process. The findings of Sanders (2002) and Wellman and Gulia (1999) indicate that distance between learners does not necessarily hamper the development of social bonds and learning communities. Therefore, to the extent that instructor-student, student-student, and student-curriculum interaction using the LLCs reinforces shared organizational goals and values, increases may be observed in job satisfaction, performance (i.e., job-related problems), and organizational commitment (see also Major, Kozlowski, Chao, & Gardner, 1995).

LLCs also may affect readiness through **reductions in work-education-family conflict**, however it is unknown how well they will do so. Adams, Jex, and Cunningham (2006) identified three types of work-family conflict: (1) time-based (actual and perceived time available, including separations from family); (2) strain-based (work strain producing family strain); and (3) behavior-based (e.g., role conflict, family versus student). Although anytime, anywhere education and training reduces learner travel requirements, the length of time away from family has been found to be generally unassociated with various individual readiness factors, such as job-related problems, lost duty time, absence from alerts or deployments, and organizational commitment (Burnam et al., 1992). However, conflicts between the demands of work, education, and family have been identified as determinants of drop out rates from distance education and reduced learning achievement (e.g., Haythornthwaite, 2005; Kreijns et al., 2003; Phelps et al., 1991; Sanders & Guyer, 2001). Research suggests that the negative impact of learning at a distance may be alleviated through the development of learning communities, perceptions that the learning environment represents organizational support for its members, and perceptions that the time spent on education is necessary (Burnam et al., 1992; Gibson & Tremble, 2006; Haythornthwaite, 2005). Anytime, anywhere education enabled by LLCs might reduce work-education-family conflict; it must not increase it.

Long-term outcome – Culture shift. The *LLC Master Plan* (March 2005) refers to the following quote from the Army Chief of Staff Army Knowledge Management Strategic Plan: "Becoming a knowledge based organization involves more than technologies – it requires deep cultural shifts – from traditional practices to collaboration, teamwork, and innovation; from information hoarding to knowledge sharing; from traditional skills to Internet-Age competencies." This reference illustrates the primary long-term goal of the lifelong learning initiative, facilitating this cultural shift through access to advanced, collaborative technologies. The means by which LLCs can have an impact on cultural shift is by **enhancing collaboration orientation** and fostering **internalization of anytime, anywhere learning** through repeated individual success with anytime, anywhere learning. The success of LLCs in accomplishing these goals depends on how well the distributed learning environment is leveraged to create the sense of a broad community of learners of which everyone, including instructors, is an important part.

Sherry and Wilson (1997) argue that transformative communication, an alternative to instructor-dominated instruction that is enabled by learning environments with internet access, promotes the internalization of anytime, anywhere learning. Students may find they have something to teach the instructor about the technology used in the course and also that they have easy access to outside experts (e.g., through websites and online discussion forums). Rather than the opposite, students may call the instructor's attention to these valuable learning resources. Through asynchronous and synchronous distributed collaboration, activity in the blended learning environment role-models a change in thinking about what a "classroom" is--from conventional notions of a lecture hall or desk and whiteboard to home offices, cafes, and even conversations around the water cooler. To the extent that students begin to see just about anything as an opportunity to learn, they have internalized anytime, anywhere learning. Along similar lines, blended learning environments--especially those that connect to a wide community of experts and peers--may enhance collaboration orientation by expanding learners' conception of the learner network and their understanding of their role in facilitating the collective knowledge acquisition of this network.

Long-term outcome – Enhanced educational cost-effectiveness. Although the establishment of a blended learning environment is associated with significant capital investment, it potentially presents a more cost-effective training and education solution over the long-term due to reduced variable costs such as printing and shipping (Whalen & Wright, 1999). Yet, due to the significant expense of technology-assisted education it is not recommended for the purposes of saving costs, but for expanding academic outreach (Willis, 2000). However, the increased cost associated with technology procurement, staffing, and housing may be offset by greater outreach, resulting in a lower cost per student than traditional alternatives. LLCs can achieve this **enhanced cost-outreach** by providing access to a greater number of students who may participate in institutional education from home and deployed locations. Increased outreach also would **enhance throughput effectiveness** relative to previous conditions as more people who require training and education are able to receive it. LLCs situated at schoolhouses that maintain ranges, equipment, and simulations for training may offset costs associated with technology procurement by **reducing the range equipment/supplies requirements** to conduct training. Finally, LLCs with in-house CBT/WBT courseware production teams, such as the Fort Leonard Wood LLC, may **enhance CBT/WBT courseware development cost-effectiveness**

relative to working with outside contractors. Such cost savings were demonstrated in Phelps et al. (1991).

METRICS AND MEASURES FOR EVALUATING LLCS

Two-hundred and twenty-nine metrics and associated measures were developed to reflect the above-described components of the LLC logic model. A complete listing of these metrics and measures is featured in Appendix A. The metric chart is organized according to the logic model structure discussed above, with metrics reflecting the status of the LLC on each of the model components, subcomponents, and elements (e.g., Activities – Technical Staff – Provide technical support). Metrics were designed to enable sampling of users or courses, rather than requiring assessment of an LLC in its entirety. Because the LLCs feature multiple levels of blended learning (Graham, 2006) metrics in the chart are associated with a description of the type of learning environment to which they apply as well as their corresponding measure. Specifying the applicable learning environment should buttress the generalizability of the chart through an examination of the level of blending and of the learning environments used in a particular LLC. The metric chart also depicts the pilot LLCs to which each metric applies.

The key design requirements for the metric measures were feasibility and utility. In order to be used, the measures must not require a great deal of in-depth system analysis or complex data analyses. Yet, the measures must provide useful information about the metrics that rule out, to the extent possible, alternative interpretations of metric data. Candidate measures featured in the metrics and measures chart in Appendix A include surveys, interviews, archival data collection (e.g., from Army personnel databases or schoolhouse financial reports), and some low-level system analysis.

The metrics and measures presented in Appendix A represent an initial attempt to specify the assessment criteria for evaluating LLCs. Some modification to this chart may be necessary, given that not all metrics and measures were tested in the present investigation. Ideally, all of the metrics in the chart applicable to a particular LLC would be used in an evaluation. This may not be feasible given time constraints or may not be necessary for well established LLCs.

APPLICATION OF THE LOGIC MODEL AND METRICS TO EVALUATING THE FORT LEAVENWORTH LIFELONG LEARNING INITIATIVE

The LLC logic model and associated metrics were used to conduct a formative evaluation of Fort Leavenworth's LLC, also called the Fort Leavenworth Lifelong Learning Initiative (LVN LLI). The complete description of this evaluation is presented in Appendix B. Data were collected during the months of September and October 2006 using surveys and interviews, system analysis, and retrieval of archival financial and enrollment data. Data collection largely focused on the application of the LVN LLI to Intermediate-Level Education (ILE) conducted in residence at Fort Leavenworth. Surveys therefore were administered to curriculum developers, instructors, and students directly involved with resident ILE (2006 February-start and 2006 August-start classes). Some interviews also were conducted with ILE instructors at satellite campuses and at Total Army School System (TASS) Battalion sites.

Overall, the evaluation results indicated that the LVN LLI is a cost-effective solution for enhancing the educational outreach of ILE curriculum materials. It currently costs approximately $163.14 more per student to deliver ILE using the LVN LLI but the increase in cost due to technology procurement and associated personnel and facilities expenses is a vanishingly small fraction of the total amount spent to deliver ILE. Moreover, the relative cost-per-student to the Army will further decrease as the printing and shipping of course materials to remote sites is completely phased out over the next two years. For what amounts practically to the same amount of money, ILE delivered online using the LVN LLI is in the process of eliminating the one- to three-year lag in curriculum content between the schoolhouse and Army reserve facilities. It also already supports anytime, anywhere learning for ILE students in residence and at satellite campuses, as reflected in system usage data.

Unfortunately, there was relatively little the LVN LLI could do to reduce the 6-10 month lag between changes in the operational environment and revisions to the *standardized* ILE curriculum due to the lengthy institutional curriculum review, revision, and vetting process. However, the LVN LLI may assist in circumventing this problem by making it easier for instructors to supplement curriculum materials with up-to-date articles, professional discussions, and emerging doctrine. Twenty-nine percent of ILE instructors surveyed reported that they supplemented the curriculum materials more frequently than in pre-LVN LLI conditions. This proportion is likely to increase as faculty become more facile with Blackboard. In addition, substantial proportions of students (>85%), instructors (74%), and course authors (80%) reported that the ILE course content was relevant to the jobs of ILE graduates.

There did appear to be some challenges to the full-scale adoption of the LVN LLI by course authors, instructors, and students in the schoolhouse. Although the rates of active adoption (i.e., primary use of the system components) increased during the first-year pilot, they remain below 100%. A combination of survey and interview data indicated that technical difficulty was not the main barrier to system use. First, a weighted average of student, course author, and instructor survey responses indicated that the LVN LLI technical support was accessible (62%) and useful (66%). Moreover, the system workarounds they reported using involved typically some other form of technology. For example, SharePoint was the most frequently cited alternative to Blackboard when posting or accessing curriculum materials.

The main barriers to system use appear to have been (a) ready availability of alternatives to the system that were more familiar and easier to access; (b) inconsistent or absent information management procedures necessary to make posted content easy to find; and (c) lack of instructor and course author involvement in and buy-in to the lifelong learning concept. As has been found in previous evaluations of this kind (Cianciolo, Heiden, & Prevou, 2006), greater success has been achieved in the technical implementation of the initiative than in the cultivation of stakeholder enthusiasm and investment. When asked what they thought the Army's main reason for implementing Blackboard and Sharepoint was, a minority of students surveyed (33%) responded that the Army had made the decision in the best interests of leader education. Although the Army surely had multiple reasons for adopting the new instructional technologies--including enhancing leader education--actively using the LVN LLI to foster students' perception of organizational support for leaders would make it a more effective asset in enhancing organizational commitment and cultural shift.

In any case, challenges to the active adoption of the LVN LLI did not hamper the academic experience of ILE students and instructors in the first-year pilot. A very high proportion of surveyed students (79% on average) reported that ILE instructors generally demonstrated the classroom facilitation behaviors recognized as critical to developing adult learners. In addition, survey responses indicated that a majority of students (a) took responsibility for their own learning via independent study (70-98%); (b) reported high learning self-efficacy (88%); and (c) were motivated to learn the topics taught in ILE (91%). While fifty-eight percent of instructors reported that the LVN LLI did not have an impact on classroom efficiency a small minority of instructors (10%) reported that the LVN LLI enhanced their classroom efficiency. Although it may seem insignificant, this result is noteworthy given the fact that the introduction of instructional technology often is associated with increased workload for faculty (Willis, 2000).

In order for the already successful LVN LLI to achieve optimal educational and organizational impact, stronger beliefs in its purpose and higher active adoption rates of its components should be achieved. The accomplishment of this goal requires fostering the instructor buy-in necessary to learn and adopt unfamiliar technologies and to role-model their use for students. Improved buy-in may be developed through (a) engaging other schoolhouse components, especially faculty and staff development, in viewing and cultivating LVN LLI-assisted teaching as a critical instructor competency; (b) encouraging and shepherding the involvement of instructors and course authors in the development of information management procedures through needs assessment and iterative system design; and (c) spreading strategic communications that explain the purpose and goals of the system, that anticipate technical limitations of the system (i.e., login requirements), and that immediately follow system outages.

CONCLUSION

The present research represents the first attempt to integrate the widely diffuse literature on program evaluation, blended learning, organizational effectiveness, and military readiness in order to conduct an evaluation of an Army technology-assisted learning initiative. The basis of the LLC assessment framework in theory makes it generalizable not only across current and future LLCs, but also across blended learning initiatives more generally, addressing a gap in the scholarly literature with regard to the effectiveness assessment of educational technology. Review of the assessment framework by key stakeholders from each of the pilot LLCs ensured generalizability across the different initiatives. The assessment framework developed as part of this investigation proved to be a feasible and useful tool for capturing and representing the functioning of blended learning initiatives such as LLCs, from the acquisition and use of resources to the achievement of organizational impact.

This research is not without its limitations, however. First, strategies for evaluating educational effectiveness have historically assumed that institutional goals for education are aligned both with student learning objectives and with those learning objectives that must be met to further society or organizational performance. The design of the LLC assessment framework is consistent with this assumption. That is, outcome measures reflecting the alignment (i.e., content coverage) between what is taught via LLCs and what must be taught in order to advance

student's expected achievement and organizational excellence were not included in the framework. This alignment is critical to achieving organizational impact via an educational initiative (see e.g., Cianciolo et al., 2006), and should be included in a comprehensive picture of LLC effectiveness. Second, the limited scope of the investigation prevented an explicit test of the validity of the assessment framework developed. Additional research should determine whether the framework (a) applies as expected to other LLCs, especially those with curricula that differ from Intermediate-Level Education; (b) produces the same results using quasi-experimental evaluation, where possible; and (c) accurately predicts the future status of an LLC based on initial evaluation and implementation of recommendations.

The findings of the Fort Leavenworth evaluation indicated the importance of taking a causal approach where quasi-experimental design was not possible. Assessment of outcomes alone would have indicated that the initiative had achieved its goals but would have obscured the fact that a subset of these goals--teaching and learning effectiveness--was achieved largely independently of the use of blended learning technologies. A causal assessment framework such as the one researched and developed in the present investigation verified whether the apparent success of an LLC was truly driven by the activities and outputs generated by the initiative. It also provided clear recommendations for bridging gaps between resources, personnel activities, system outputs, and outcomes in order to enhance impact. Future LLCs will achieve the greatest success by engaging all stakeholders in the design and implementation process in order to win the buy-in of instructors, other staff, and learners. The enhanced functioning of the initiative resulting from stakeholder engagement will enable the LLC to serve as a powerful driver of lifelong learning and organizational change.

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APPENDIX A
LLC COMPREHENSIVE METRIC AND MEASURE CHART

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Improved teaching and learning environment **Metrics answer the question: Does the LLC provide up-to-date, relevant course content, advanced instructional materials, greater classroom efficiency, instructors who facilitate adult lifelong learning, and a community of lifelong learners?** **So what?: Blended learning solutions such as an LLC have the capacity to enable rapid information sharing and automation of administrative tasks that take away from classroom learning time. They also enable access to/delivery of interactive multimedia instruction. For a blended learning solution to have an impact greater than traditional solutions, instructor performance must change to support learner-centered instruction. This supports the development of learning communities, which are one determinant of lifelong learning.**						
Outcome: Enhanced Course Relevance	Frequency of instructor updates to ongoing course materials (i.e., # course-related uploads to Bb daily and weekly)	Resident/satellite/distributed-collaborative; All topics taught by an instructor	System analysis + Instructor survey (single item)	X	X	X
	Frequency of instructor updates to ongoing course materials relative to pre-LLC situations	Resident/satellite/distributed-collaborative; All topics taught by an instructor	Instructor survey (single item)	X	X	X
	Frequency of curriculum developer and/or instructor updates to main curriculum (before each course delivery, semi-annually, annually, other)	All locations; All topics, both facilitated by an instructor and instructorless	Curriculum developer survey (single item)	X	X	X
	Frequency of curriculum developer updates to main curriculum relative to frequency prior to implementation of LLC	All locations; All topics, both facilitated by an instructor and instructorless	Curriculum developer survey (single item)	X	X	X
	Curriculum developer perceptions of main curriculum relevance	All locations; All topics, including CBT/simulation-delivered courseware	Curriculum developer survey (including questions about frequency of updating relative to what's needed)	X	X	X
	Instructor perceptions of course relevance (main and supplemental content)	All locations; All topics taught by an instructor	Instructor survey (including issue of FOUO content and international students, where applicable)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Enhanced Course Relevance, contd.	Student perceptions of course relevance (main and supplemental content)	All locations; All topics, including CBT/simulation-delivered courseware	Student survey (including issue of FOUO content and international students, where applicable)	X	X	X
	% of curriculum materials that do not address--where it is appropriate--urban operations, counterinsurgency, media relations, asymmetric warfare, stability and reconstruction, cultural relations, transformation and tactics, or joint operations	All locations; All topics, especially higher-order/cognitive topics (e.g., Captain's Career Course, Strategic education, etc.) and topics with scenario-based practical exercises	System analysis	X	X	X
	% courses with virtual "field trips;" discussing class topics with SMEs or attending lectures via VTC (especially involving people currently in the field or recently returned)	Resident/satellite/distributed-collaborative; All topics (especially higher-order/cognitive)	System analysis + Instructor survey	X		
	% of required equipment or other training simulations provided by the LLC	Distributed-individual (and possibly distributed collaborative); Equipment training	System analysis + Literature review or interviews		X	X
	% of registered users who report that they have found relevant, useful courses, courseware, or training materials via the LLC	All locations; All topics, including CBT/simulation-delivered courseware	User survey (multiple items each relating to an aspect of content delivered via the LLC)	X	X	X
Outcome: Enhanced Instructional Efficiency	% time spent in classroom doing administrative tasks, including announcements, handouts, and testing (estimated, and where applicable)	Resident/satellite/distributed-collaborative; All topics taught by an instructor	Classroom observation + Instructor survey	X	X	X
	% reduction in time spent in classroom doing administrative tasks, including announcements, handouts, and testing (estimated, and where applicable)	Resident/satellite/distributed-collaborative; All topics taught by an instructor	Instructor survey	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Enhanced Instructional Efficiency, contd.	Ratio of time spent on CBT/WBT courseware production (analysis/design/development/implementation) using LLC courseware developers vs. outside contractors (value < 1 indicates a time savings using LLC courseware production process)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Archival data (hours records, contractor invoices, etc.) + Courseware developer interview + Contractor interview (Note, comparisons must be made using courseware of roughly equivalent length and interactivity)		X	
Outcome: Instructor as facilitator of adult learning	Quality of real-time instructor facilitation behaviors in the classroom (traditional or virtual)	Resident/satellite/distributed-collaborative; Higher-order/cognitive course topics (e.g., Captain's Career Course, Strategic education, etc.)	Student survey (multiple indicators to include providing clear guidance on expectations and evaluation criteria, providing positive and informative feedback, providing challenges to students without overwhelming them, assigning tasks and roles within group tasks, facilitating analysis and reflection through questioning) + Classroom observation w/ rater checklist, to include the same indicators as listed above	X	X	X
	Quality of computer-based "instructor" facilitation behaviors in individual CBT/WBT	Distributed-individual; All CBT/WBT topics	Student survey (multiple indicators, as above, except applied to the structure and interactivity of the CBT/WBT) + System analysis – observer ratings of CBT/WBT using the above criteria		X	

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Instructor as facilitator of adult learning, contd.	Quality of instructor facilitation behaviors during asynchronous instruction	Resident/satellite/distributed-collaborative; All topics	Student survey (multiple indicators, as above, to real-time instructor facilitation + System analysis – observer ratings of the organization and explanation of postings, use of asynchronous space to conduct administrative tasks (including assessment and group assignments), cognitively buttress lessons, and facilitate a positive environment/socialization	X	X	X
	% students reporting that they were encouraged to contribute materials to course curriculum	Resident/satellite/distributed-collaborative (NOT individual CBT/WBT); All topics (especially higher-order/cognitive)	Student survey + Instructor survey (single item)	X	X	X
	% students reporting that instructors encouraged them (or demonstrated how) to use resources other than him/herself (including SMEs and other students) for class work or other purposes	Resident/satellite/distributed-collaborative (NOT individual CBT/WBT); All topics (especially higher-order/cognitive)	Student survey (single item)	X	X	X
Outcome: Presence of learning community	% students reporting a sense of commitment to and among classmates to share information, provide task support, and to provide social/emotional support (reference criterion depends on class size)	Resident/satellite/distributed-collaborative; All topics	Student survey (multiple items, one for each type of helping behavior)	X	X	X
	% students engaging each other in discussion of course-related or other topics outside of the classroom (e.g., in Bb, Sharepoint, or forums) – w/ and w/o instructor	Resident/satellite/distributed-collaborative; All topics	Student survey (multiple items related to different types of discussion) + System analysis	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Presence of learning community, contd.	Presence (Y/N) of a student leader using Sharepoint or other means to collaboratively organize student efforts (due date lists, class calendar, etc.)	Resident/satellite/distributed-collaborative; All topics	Student survey (single item) + System analysis	X	X	X
	% students reporting freedom to participate in classroom (traditional or virtual) activity	Resident/satellite/distributed-collaborative; All topics	Student survey (to include items on conversation dominance, openness of instructor, feelings of trust in constructive criticism)	X	X	X
	% students engaging in discussion of course topics inside the classroom (traditional or virtual) – w/ and w/o instructor	Resident/satellite/distributed-collaborative; All topics	Classroom observation (summarization of 1009 forms, where applicable)	X	X	X
	% students reporting a sense of having been through a shared experience with classmates	Resident/satellite/distributed-collaborative; All topics	Student survey (to include items on feelings of camaraderie and interpersonal connection)	X	X	X
	% students reporting intent to keep in touch with classmates after course is over	Resident/satellite/distributed-collaborative; All topics	Student survey (to include items on social and professional reasons for contact)	X	X	X
Outcome: Advanced CBT/WBT courseware for distributed/distance learning	% of courseware content that is SCORM conformant	Distributed-individual/distributed-collaborative; All CBT/WBT topics	Archival data (records of ATSC approval of SCORM conformance -- may require coordination with outside contractors developing courseware)		X	
	% of courseware modules comprised of instructional strategies/levels of interactivity that are appropriate to lesson content	Distributed-individual/distributed collaborative; All CBT/WBT topics (Note that CBT/WBT is analyzed as part of instructor facilitation, above)	System analysis - observer ratings of courseware based on best practice in inst. design (to include levels of interactivity, assessment, feedback, scaffolding, collaborative learning, support of social interaction, etc.)		X	

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Advanced CBT/WBT courseware for distributed/distance learning, contd.	% of educational/training requirements that involve collective/team skills that are taught using a synchronous collaborative learning environment (including virtual classmates/teammates)	All locations; All topics related to collective skills training/competency education	System analysis + Coordination with course managers		X	
	Quality ratings for CBT/WBT produced or overseen by LLC courseware production team (relative to criterion)	Distributed-individual/distributed-collaborative; All MANSCEN topics taught using CBT/WBT	Special purpose measure (summary measure of observer ratings of courseware based on best practice, see above metric)		X	
	Ratio of quality ratings for CBT/WBT produced or overseen by LLC courseware production team relative to CBT/WBT not produced or overseen by LLC courseware production team (where applicable, comparison could be across LLCs)	Distributed-individual/distributed-collaborative; All MANSCEN topics taught using CBT/WBT	Special purpose measure (comparison of summary measures of observer ratings of courseware based on best practice, see above metric)		X	
Outcome: Improved student performance **Metrics answer the question: Does the LLC enable higher-order thinking (where applicable), robust skill development, reflective capability, learner responsibility, learner self-efficacy, and learner motivation?** **So what?: The technologies comprising the LLC are designed to revolutionize instruction such that is learner-centered, which enhances student learning performance during and after a course. The aspects of improved student performance listed below in the metric categories capture the student behaviors of lifelong adult learners.**						
Outcome: Enhanced higher-order thinking	Ratio of % students with "Application" or higher cognitive level attained on writing assignments before implementation of LLCs to % after implementation	All (where writing assignments are included); Higher-order/cognitive course topics that have writing assignments	Observation (raters, 1009 form) + Archival data (1009 form, LNVW only), where possible	X	X	X
	% students with "Application" or higher cognitive level attained in writing assignments	All (where writing assignments are included); Higher-order/cognitive course topics that have writing assignments	Observation (raters, 1009 form)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Enhanced higher-order thinking, contd.	Ratio of % students with "Application" or higher cognitive level attained on presentations before implementation of LLCs to % after implementation	Resident/satellite/distributed-collaborative; Higher-order/cognitive course topics that have presentations	Observation (raters, 1009 form) + Archival data (1009 form, LNVW only), where possible	X	X	X
	% students with "Application" or higher cognitive level attained on presentations	Resident/satellite/distributed-collaborative; Higher-order/cognitive course topics that have presentations	Observation (raters, 1009 form)	X	X	X
	Ratio of % students with high participation quality scores in formal group activities before implementation of LLCs to % after implementation; participation scores to include: o Elements of reasoning (overall, average scores of 4-5) o Intellectual standards (overall, average scores of 4-5) o Cognitive level attained of "Application" or higher	Resident/satellite/distributed-collaborative; Higher-order/cognitive course topics that have formal group activities	Observation (raters) + Archival data (raters, 1009 form, LNVW only), where possible	X	X	X
	% students with high participation quality scores in formal group activities, to include elements of reasoning, intellectual standards, and cognitive level	Resident/satellite/distributed-collaborative; Higher-order/cognitive course topics that have formal group activities	Observation (raters, 1009 form)	X	X	X
Outcome: Enhanced skill development	% students with passing scores on a scenario-based transfer/application of skills/competencies assessment	All locations; All topics [especially skill-based course topics (e.g., MOSQ training)]	Special purpose measure (CBT, collaborative, where applicable – analogous to capstone exercise)		X	X
	% students demonstrating effective individual competency during classroom group practical exercises or capstone exercises	Resident/satellite/distributed-collaborative; Course topics that involve learning collective skills (e.g., mission planning, information management, etc.)	Special purpose measure (Rater observations of classroom practical exercises/capstone exercises)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Enhanced skill development	% student groups demonstrating effective team/collaboration skills during classroom (traditional or virtual) practical exercises or capstone exercises	Resident/satellite/distributed-collaborative; Course topics that involve learning collective skills (e.g., mission planning, information management, etc.)	Special purpose measure (Rater observations of classroom practical exercises/capstone exercises)	X	X	X
Outcome: Enhanced reflective capability	Ability to generate thoughtful, reflective questions about course topics or professional area of expertise	All locations; All topics (especially higher-order/cognitive)	Special purpose measure (fluency assessment)	X	X	X
Outcome: Enhanced responsibility for own learning	% registered students who used BCKS Warrior Knowledge Base or Leader Network to supplement course materials, complete assignments, or for own research	All locations; All topics	Student survey	X		
	% registered students who used other Army KM resources (including SMEs and other forums) to supplement course materials, complete assignments, or for own research	All locations; All topics	Student survey	X	X	X
	% registered students who used non-Army resources (e.g., Google, Wikipedia, etc.) to supplement course materials, complete assignments, or for own research	All locations; All topics	Student survey	X	X	X
	% registered students who report accessing course materials in Bb to prepare for class	Resident/satellite/distributed-collaborative; All topics	Student survey	X	X	X
	% registered students who access a particular Bb page (containing course materials) *prior* to when the corresponding class/lesson was held	Resident/satellite/distributed-collaborative; All topics	System analysis	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Enhanced responsibility for own learning, contd.	Ratio of # times students access Bb during course to # lessons in the course (i.e., are students accessing Bb more than the absolute minimum requirement to gather materials)	Resident/satellite/distributed-collaborative; All topics	System analysis	X	X	X
	Pattern of access to lesson materials in Bb over course duration (horizontal vs. negatively skewed distribution)	Resident/satellite/distributed-collaborative; All topics	System analysis	X	X	X
	% registered students who report a sense of personal responsibility for their professional development and learning	All locations; All topics	Student survey	X	X	X
Outcome: Enhanced learning self-efficacy	% students who report that they are capable of leading their own learning process	All locations; All topics	Student survey (composite of multiple indicators, including time, resource, technical, and social aspects)	X	X	X
Outcome: Enhanced motivation to learn	% students who report that they were motivated to learn subjects addressed by the courses they took	All locations; All topics	Student survey (composite of multiple indicators of engagement, enjoyment, etc.)	X	X	X
Outcome: Enhanced Mission Readiness **Metrics answer the question: Does the LLC have an impact on aspects of mission readiness that relate to personnel and training effectiveness, such as training status and unit status reporting?** **So what?: Mission readiness represents a partial "bottom line" for LLCs. If LLCs enhance the learning environment and student performance, but there is no impact on the ability of units to conduct the activities (i.e., missions) that learning and performance support, then relatively little impact can be achieved by the initiative. Training status and unit status reporting were a focus because these aspects of mission readiness are well defined and have a clear link to LLC goals. Other aspects of readiness, such as unit performance at CTCs, are multiply determined and so do not make good metrics, especially when a quasi-experimental design cannot be used.**						
Outcome: Reduced Time to Optimal Training Status	% reduction of average time in training "holding status"	Distributed-collaborative/distributed-individual; All topics	Archival data – ATRRS and/or ESORTS	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Reduced Time to Optimal Training Status, contd.	Estimated days to complete coursework as a resident in training (including travel, registration, etc.)/Actual time to complete course as a non-resident in training	Distributed-collaborative/distributed-individual; All topics	Archival data – Coordination with proponent course managers	X	X	X
Outcome: Enhanced Unit Status Reporting	% increase in average MOSQ percentage contained in USRs	All locations (especially distributed); MOS-based training	Archival data - GSORTS/ESORTS		X	X
	% reduction in "not-P-1" USR reason codes for "MOS Imbalances," "Not MOS Qualified," and "Not MOS qualified—awaiting training"	All locations (especially distributed); MOS-based training	Archival data - GSORTS/ESORTS		X	X
	% reduction in "not-T-1" USR reason codes for "MOS imbalances," "Shortage-qualified officers," and "Squad/crew qualification low"	All locations (especially distributed); MOS-based training	Archival data - GSORTS/ESORTS		X	X
Outcome: Enhanced MOSQ Training Status	% increase in proportion of drilling reservists who are duty MOSQ	All locations (especially distributed); MOS-based training	Archival data - SIDPERS		X	X
	% decrease in non-DMOSQ enlisted reservists/guard who are duty skill level between 2 and 5	All locations (especially distributed); MOS-based training	Archival data - SIDPERS		X	X
	% reduction in proportion of enlisted reservists/guard promoted without having taken the NCOES or OES course required for their grade	All locations (especially distributed); All topics	Archival data - SIDPERS	X	X	X
	% reduction in proportion of reserve/guard E-5s, E-6s, and E-7s who need NCOES courses	All locations (especially distributed); MOS-based training	Archival data - SIDPERS		X	X
Outcome: Enhanced organizational commitment (affective)	% users (students and non-student users) who report feeling that the LLCs reflect Army intent to support the warfighter	All locations; All topics	User survey (single item)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Enhanced organizational commitment (affective), contd.	% users (students and non-student users) who report feeling that using the LLCs made them feel like the Army had personally invested in their professional development	All locations; All topics	User survey (single item)	X	X	X
	% users (student and non-student users) who report feeling that the LLCs indicate that the Army is working hard to improve educational access/quality	All locations; All topics	User survey (single item)	X	X	X
	% users who report that using the LLC has made them proud to be a member of the Army	All locations; All topics	User survey (single item)	X	X	X
	% users (student and non-student users) who report that using the LLCs enhanced their job/organizational satisfaction	All locations; All topics	User survey (single item)	X	X	X
Outcome: Enhanced socialization in organizational goals and values	% users who report feeling that the (physical) LLC represents the goals and values of the organization, and that they feel they share these goals and values	All locations; All topics	User survey (single item)	X	X	X
	% users who report feeling that the people they have encountered via the LLC represent the goals and values of the organization, and that they feel they share these goals and values	All locations; All topics	User survey (single item)	X	X	X
	% users who report that using the LLC has made them feel like a better fit to the organization	All locations; All topics	User survey (single item)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Reduced Work-Education-Family Conflict	% student users reporting education-related problems due to at-home education demands placed by the LLC (e.g., inability to complete assignments on time; low % is better)	All locations; All topics	Student survey (single item)	X	X	X
	% student users reporting job-related problems due to at-home education demands placed by the LLC (e.g., fatigue, distraction, temper, etc.; low % is better)	All locations; All topics	Student survey (single item)	X	X	X
	% student users reporting lost duty time due to at-home education demands placed by the LLC (low % is better)	All locations; All topics	Student survey (single item)	X	X	X
	% student users reporting family-related problems due to at-home education demands placed by the LLC (e.g., arguments with spouse or children; low % is better)	All locations; All topics	Student survey (single item)	X	X	X
Outcome: Improved Individual and Unit Performance in the Field **Metrics answer the question: Does the LLC reach its stated goal of supporting just-in-time competency in the field?** **So what?: As with mission readiness, improved performance in the field is a partial bottom line for LLCs. If LLCs do not have an impact on field performance, they may not be worth additional funding. Unit-level measures were not a focus because they are multiply determined.**						
Outcome: Just-in-Time Competency	% of deployed students (and formerly deployed students) who report receiving just-in-time refresher, prerequisite, and/or new skills training from the LLC while deployed	Distributed-collaborative/distributed-individual; All relevant topics	Student survey (plus stories)		X	X
	% of stateside students (particularly RC) who report receiving just-in-time reclassification, qualification, and/or new skills training from the LLC (e.g., enabling presence at AT)	Distributed-collaborative/distributed-individual; All topics (especially MOSQ and equipment training)	Student survey (plus stories)		X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Just-in-Time Competency, contd.	% of deployed users (and formerly deployed users) who report gaining just-in-time knowledge from the LLC while deployed	N/A	User survey (plus stories)		X	X
Outcome: Adoption of Lifelong Learning Orientation **Metrics answer the question: Does the LLC foster a lifelong learning orientation in its users?** **So what?: Lifelong learning orientation is key to the continuous learning necessary for an adaptive force. One's intent to participate in lifelong learning is often determined by the requirement to learn (i.e., situational vs. personal characteristics). For this reason, users' perceptions of situational characteristics are a primary focus of these metrics.**						
Outcome: Distal Motivation to Engage in Lifelong Learning	% users who indicate that they intend to participate in further work-related formal and informal education/professional development that is not required	All locations; All topics	Student survey (single item, National average for formal ed = 59-62%; 76-77% informal)	X	X	X
	Perceived utility of maintaining or improving existing skills for achieving career benefits (i.e., the more I learn, the greater the payoff)	All locations; All topics	Student survey (single item)	X	X	X
	Perceived utility of participating in work-related education for maintaining or improving existing skills and achieving career benefits (i.e., distance ed vs. on-the-job learning)	All locations; All topics	Student survey (single item)	X	X	X
	Perceived level of effort required to achieve successful performance in distance-based, self-directed education	All locations; All topics	Student survey (single item)	X	X	X
	% users who indicate that they intend to counsel peers and subordinates to participate in non-required education/professional development	All locations; All topics	Student survey (single item)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Culture Shift **Metrics answer the question: Does the LLC promote a shift in individuals' attitudes that collectively will result in an Army-wide cultural shift?** **So what?: A culture shift away from individual institution-based learning to personal-network-enabled (collaborative) anytime/anywhere learning is a critical enabler of an adaptive force that learns whenever learning is required, not when it is provided by the schoolhouse.**						
Outcome: Enhanced Collaboration Orientation	% users who indicate that they intend to participate in work-related education/professional development as a volunteer (e.g., via forums)	All locations; All topics	Student survey (single item)	X	X	X
Outcome: Internalization of Anytime/ Anywhere Learning	Broad thinking regarding sources of information for learning	All locations; All topics	Special purpose measure (fluency assessment or situational judgment assessment)	X	X	X
	Broad thinking regarding the location of learning environments	All locations; All topics	Special purpose measure (fluency assessment or situational judgment assessment)	X	X	X
	Broad thinking regarding sources of learning authority	All locations; All topics	Special purpose measure (fluency assessment or SJA)	X	X	X
Outcome: Cost-Effectiveness **Metrics answer the question: Does the LLC enable more training at a better cost than traditional alternatives?** **So what?: Web-based blended learning solutions are critical enablers of broadening the student base, which reduces cost/time per student. If this is not achieved, something has gone wrong with the initiative.**						
Outcome: Cost-outreach Function	Cost per student with LLC versus prior to LLC implementation	All locations; All topics	Archival data (cost data -- see resource metrics)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Throughput Effectiveness	Ratio of graduates ("seated" and "seatless") to training quotas (should be at least >.80 - estimates how well LLC gets around the issue of limited seats and incomplete seat reservations; greater than 1 is ideal because more need training than are captured in the training quota)	All; All courses to which seats are applicable	Archival data - ATRRS	X	X	X
	Ratio of "seatless" students to "seated" students (should be greater than ratio prior to LLC implementation)	All; All courses to which seats are applicable	System analysis + ATRRS	X	X	X
Outcome: CBT/WBT Courseware Development Cost Effectiveness	Ratio of dollars spent on CBT/WBT courseware production (analysis/design/development/implementation) using LLC courseware developers vs. outside contractors (value < 1 indicates a time savings using LLC courseware production process)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Archival data (hours x labor records, contractor invoices, etc.) + Courseware developer interview + Contractor interview (Note, comparisons must be made using courseware of roughly equivalent length and interactivity)		X	
Outcome: Decreased range equipment/ supplies requirements	Ratio of proponent range supplies (e.g., ammunition, fuel, etc.) used per exercise before and after LLC implementation (assumes that enhanced competency enabled by LLC will make performance more efficient during capstone field exercises for courses taught via the LLC)	Proponent ranges; All topics featuring a capstone exercise	Archival data + Coordination with range managers/directors		X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Decreased range equipment/ supplies requirements	Ratio of proponent range or other equipment (e.g., digital systems) requirements before and after LLC implementation (assumes that use of simulated equipment in the LLC will reduce the need for actual equipment located at the schoolhouse)	Proponent ranges/equipment facilities; All topics featuring equipment simulation	Archival data + Coordination with range and equipment facilities managers/directors		X	X
Output: 24/7, Uniform Access **Metrics answer the question: Does the LLC really provide 24/7, uniform access, and is the intended audience using it as expected?** **So what?: The LLC cannot achieve its stated outcomes unless it is available and being used.**						
Output: 24/7 Access to System – System Availability	# and total and average duration of technical outages (altogether and broken down by component application)	All locations (including non-course locations); All topics (plus knowledge sharing)	System analysis - Coordination with technical staff	X	X	X
	% operational time spent in technical outages or otherwise down (altogether and broken down by component application)	All locations (including non-course locations); All topics (plus knowledge sharing)	System analysis - Coordination with technical staff	X	X	X
Output: 24/7 Access – Actual System Usage	Pattern of access as a function of time of day (horizontal vs. bi-modal vs. some other distribution)	All locations (including non-course locations); All topics (plus knowledge sharing)	System analysis - Coordination with technical staff	X	X	X
	Frequency of access to system during normal business hours vs. off-hours	Stateside course and non-course only; All topics (plus knowledge sharing)	System analysis - Coordination with technical staff	X	X	X
	% users reporting more than minor difficulty accessing the system (broken down by LLC component and location type)	All locations (including non-course locations); All topics (plus knowledge sharing)	User survey - 1 question asking users to rate system accessibility	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Outcome: Uniform Access to System	% users from each applicable location (schoolhouse, satellite locations, TASS region sites, and home/deployed; the ideal balance at any one time is representative of the population)	All locations (including non-course locations); All topics (plus knowledge sharing)	System analysis (coordination with technical staff) + Archival data (e.g., SIDPERS, to get population data)	X	X	X
	% curriculum materials found in Bb that are common across user locations (schoolhouse, satellite locations, TASS region sites, and home/deployed)	All locations; All topics	System analysis - Coordination with technical staff ("common" materials need not match exactly, but must enable students to meet the same learning objectives)	X	X	X
	# of other course materials (e.g., instructor updates) available to resident students that are not present in the LLC (or domain-general components of the LLC) and therefore not available to people at other locations	All locations; All topics	System analysis - Coordination with technical staff (requires access to all sections, teams, etc. of a particular course at all applicable locations)	X	X	X
Outcome: Actual System Usage (General)	% of possible users actually registered in the LLC	All locations (including non-course locations); All topics (plus knowledge sharing)	System analysis + Archival data (e.g., SIDPERS, to get population stats)	X	X	X
	% of registered users actively using the system (as a whole and broken down by LLC component; "actively" defined as using the system as or more frequently than alternatives)	All locations (including non-course locations); All topics (plus knowledge sharing)	User survey (multiple questions on the different uses of the LLC, e.g., course instruction vs. knowledge acquisition vs. training)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Output: Actual System Usage (General), contd.	User perceptions of usability and utility (altogether and broken down by LLC component)	All locations (including non-course locations); All topics (plus knowledge sharing)	User survey (2 questions, 1 each for usability and utility, per component)	X	X	X
Output: Actual System Usage (Course Instruction Only)	% students who seek alternative means to get curriculum materials other than through the LLC (e.g., email attachments or thumb drives due to limitations in access)	All locations; All topics	User survey (1 question - also a measure of active use)	X	X	X
	% students who access other components of the LLC (besides Bb or other intended portal) to conduct their studies or collaborate with peers or experts (captures breadth of use of the system)	All locations; All topics	User survey (1+ questions - one for each relevant activity)	X	X	X
	% students who primarily access non-LLC resources to conduct their studies or collaborate with peers or experts	All locations; All topics	User survey (1+ questions - also measures of active use)	X	X	X
Output: Actual System Usage (Knowledge Sharing Only)	% registered non-students or former students who primarily seek alternative means to get knowledge other than through reaching back to the LLC	N/A (assumes requestors are non-students)	User survey (1 question - also a measure of active use) + Coordination with technical staff (to identify non-students or former students)	X	X	X
	% registered non-students or former students who use Bb or other components of the LLC to collaborate with course developers, instructors, and students	N/A (assumes requestors are non-students)	User survey (1+ questions - one corresponding to each population) + Coordination with technical staff (to identify non-students or former students)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Output: Actual System Usage (Knowledge Sharing Only), contd.	% registered non-students or former students who access course curricula in the LLC to conduct reachback studies	N/A (assumes requestors are non-students)	User survey (1 question) + Coordination with technical staff (to identify non-students or former students)	X	X	X
	% registered non-students or former sutdents who access other components of the LLC (e.g., learning content library, BCKS, etc.) to conduct reachback studies as or more often than alternatives	N/A (assumes requestors are non-students)	User survey (1+ questions - also a measure of active use) + Coordination with technical staff (to identify non-students or former students)	X	X	X
Output: CBT/WBT for conducting proponent courses **Metrics answer the question: Does the LLC really support the proponent's needs for CBT/WBT?** **So what?: The LLC (MANSCEN only) cannot meet its objectives for learning effectiveness without providing CBT/WBT to the schoolhouse.**						
Output: Readily Available CBT/WBT to Meet Course Needs	% instructors and course managers who report being satisfied with the timing/quality of the CBT/WBT courseware production/modification/validation process	All locations using CBT/WBT; MANSCEN topics only	Instructor/Course manager survey (multiple questions relating to when updated course materials are received, whether the required course materials are available, the level of input allowed to the process, etc.)		X	
	% instructors and course managers who report being satisfied with the usability and accessiblity of the CBT/WBT produced, modified, validated, or overseen by the LLC courseware production team	All locations using CBT/WBT; MANSCEN topics only	Instructor/Course manager survey (multiple questions relating to aspects of usability, accessibility, and instructional quality)		X	

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Output: Readily Available CBT/WBT to Meet Course Needs, contd.	% students who report being satisfied with the usability and accessibility of the CBT/WBT produced, modified, validated, or overseen by the LLC courseware production team	All locations using CBT/WBT; MANSCEN topics only	Student survey (multiple questions relating to aspects of usability and accessibility)		X	
	Ratio of trouble tickets and/or course interruptions resulting from CBT/WBT playability issues in DL XXI classrooms and DTFs for CBT/WBT developed and maintained or overseen by LLC courseware production team relative to CBT/WBT developed, maintained, and overseen by alternatives (where applicable, comparison may be across LLCs)	DL XXI classrooms and digital training facilities; All MANSCEN topics taught using CBT/WBT	System analysis + Coordination with courseware production team		X	
	Ratio of trouble tickets and/or course interruptions resulting from other shortfalls in CBT/WBT developed and maintained or overseen by courseware production team vs. CBT/WBT developed, maintained, and overseen by alternatives (where applicable, comparison may be across LLCs)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	System analysis + Coordination with courseware production team + Course manager and/or instructor survey		X	
	% courses that have courseware to meet basic requirements (opposite metric = courseware backlog)	Distributed-individual/distributed-collaborative; All MANSCEN topics taught using CBT/WBT	Archival data (review of courseware requirements and planning documentation) + Course manager survey + Courseware production team survey		X	

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Technical Staff **Metrics answer the question: Are the technical staff effectively carrying out the activities they are designated to carry out?** **So what?: If the technical staff does not carry out their assigned activities, the LLC will not function effectively and will not be accessible or usable by students, instructors, and course developers.**						
Activities: Provide "train-the-trainer" training on LLC components (including SOPs)	% instructors and course developers trained to technical criterion (i.e., application use)	All locations; All topics	Special purpose measure (knowledge test based on instructional materials)	X	X	X
	% instructors and course developers trained to criterion on institutional/departmental SOPs for content management/delivery	All locations; All topics	Special purpose measure (knowledge test based on SOPs)	X	X	X
	Quality of training	All locations; Topics N/A	Observation – raters (using checklist of course quality indicators based on best practice in adult learning)	X	X	X
	Perceived utility of/satisfaction with training	All locations; Topics N/A	Trainee survey (items relating to the relevance of the training to addressing key challenge areas)	X	X	X
	% repeated technical trouble tickets (i.e., multiple users with same request) that are integrated into technical training updates	All locations; Topics N/A	System analysis – combined examination of help desk data and training content	X	X	X
	Participation in/guidance on SOP development by stakeholders (Y/N)	All locations; All topics	Trainee survey (items relating to whether these people were included for input into SOPs)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Provide "train-the-trainer" training on LLC components (including SOPs), contd.	Presence (Y/N) of help documentation for trainee self-development on applications and their use	All locations; All topics	System analysis and survey (technical staff, instructors and curriculum developers)	X	X	X
	Accessibility, usability, and utility of help documentation for trainee self-development	All locations; Topics N/A	Trainee survey (instructors and curriculum developers)	X	X	X
Activities: Provide support for answering Field Army users' operational questions	% user operational questions (phone, email, other) addressed (requester acknowledged, answer attempted, appropriate routing initiated) within ¼ hour of posting	N/A (assumes requestors are non-students, i.e., that operational questions come from the field)	System analysis – help desk data	X	X	X
	% user operational questions requiring re-routing (beyond schoolhouse) that are re-routed within ¼ hour of notice	N/A (assumes requestors are non-students, i.e., that operational questions come from the field)	System analysis – help desk data	X	X	X
	Perceived accessibility/responsiveness of operational technical support	N/A (assumes requestors are non-students, i.e., that operational questions come from the field)	User survey + coordination with technical staff (to locate operational users)	X	X	X
	Perceived utility of operational technical support	N/A (assumes requestors are non-students, i.e., that operational questions come from the field)	User survey + coordination with technical staff (to locate operational users who have requested technical support)	X	X	X
	% repeated operational questions that are integrated into help desk FAQ updates or other forums	All locations (including non-course locations); Topics N/A	System analysis (help desk data and website analysis) + Technical staff survey	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Provide technical support to students, faculty, and curriculum developers	% technical trouble tickets (phone or walk-in) closed within ¼ hour of posting	All locations (including non-course locations); Topics N/A	System analysis – help desk data	X	X	X
	% technical trouble tickets (email) closed within ½ hour of posting	All locations (including non-course locations); Topics N/A	System analysis – help desk data	X	X	X
	Perceived accessibility/responsiveness of technical support	All locations (including non-course locations); Topics N/A	User survey (1 item for each characteristic)	X	X	X
	Perceived utility of technical support	All locations (including non-course locations); Topics N/A	User survey (1 item for each characteristic)	X	X	X
	% repeated technical trouble tickets (i.e., multiple users with same request) that are integrated into help desk FAQ updates	All locations (including non-course locations); Topics N/A	System analysis – help desk data and website analysis	X	X	X
Activities: Perform technology setup, integration, customization, and management of LLC components	% repeated technical trouble tickets (i.e., multiple users with same request) that are integrated into application customization updates	All locations (including non-course locations); Topics N/A	System analysis and technical staff interviews	X	X	X
	# technical problem tickets that resulted from ineffective technology management (e.g., account problems, template bugs, etc.)	All locations (including non-course locations); Topics N/A	System analysis – help desk data	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Perform technology setup, integration, customization, and management of LLC components, contd.	Perceived responsiveness and competency of technical staff to customization requests	All locations (including non-course locations); Topics N/A	User survey (multiple indicators to include management of user accounts, creation of initial sites and templates, archive management, etc.)	X	X	X
Activities: Migrate course content across LLC components (e.g., from Sharepoint to Bb)	% content migrated across applications within 24 hours	All Bb-based instruction; All topics	System analysis + technical staff survey	X	X	X
	Perceived speed of the content migration process	All Bb-based instruction; All topics	Instructor survey (1 or 2 items capturing whether content is available in Bb when needed)	X	X	X
Activities: Curriculum Developers (Block Authors, SMEs, and Instructors) **Metrics answer the question: Are the curriculum developers carrying out the tasks they are designated to carry out?** **So what?: If curriculum developers do not carry out the tasks they are assigned to do, course content will not be up-to-date and relevant and will not the product of multiple expert perspectives on the topic to be learned. In addition, the adequacy of course content will be subject to individual differences, rather than the result of a finely tuned collaborative process.**						
Activities: Collaboratively generate course content	% curriculum developers using Sharepoint to store, share, and revise course content materials	All locations; All topics	System analysis + Developer survey (multiple items, 1 for each task)	X	X	X
	% curriculum developers who report being able to use Sharepoint outside of the schoolhouse setting	All locations; All topics	Developer survey (single item)	X	X	X
	% curriculum developers who report using means to collaborate other than/in addition to Sharepoint (e.g., email, thumb drives, etc.)	All locations; All topics	Developer survey (single item)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Collaboratively generate course content, contd.	% curriculum developers who actively work together to revise/improve course materials	All locations; All topics	Developer survey (single item)	X	X	X
	Perceived ease of using Sharepoint to share documents and other materials used in generating course content	All locations; All topics	Developer survey (single item)	X	X	X
Activities: Update course content based on feedback and access to Army KM (e.g., CALL, BCKS, etc.)	% curriculum developers using BCKS Warrior Knowledge Base and/or Leader Network to enhance course content	All locations; All topics	Developer survey (single item)	X		
	% curriculum developers using other Army KM resources (e.g., CALL, AKO) to enhance course content	All locations; All topics	Developer survey (single item)	X	X	X
	% curriculum developers using non-Army resources (e.g., Google) to enhance course content	All locations; All topics	Developer survey (single item)	X	X	X
	% curriculum developers who report incorporating instructor feedback into course content in time for the next course delivery	All locations; All topics	Developer survey (single item)	X	X	X
	Perceived ease of updating course content within the LLC framework	All locations; All topics	Developer survey (single item)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Update course content based on feedback and access to Army KM (e.g., CALL, BCKS, etc.), contd.	Perceived utility of providing feedback to curriculum developers	All locations; All topics	Instructor survey (single item)	X	X	X
Activities: (Early adopters) Lead the development of SOPs for leveraging the capabilities of system components (e.g., content management systems)	Presence of formal SOPs for leveraging the capabilities of the software applications, including content organization (Y/N)	All locations; All topics	System analysis + Developer survey + Tech staff survey	X	X	X
	Presence of informal SOPs for leveraging the capabilities of the software applications, including content organization (Y/N)	All locations; All topics	System analysis + Developer survey	X	X	X
	If yes, % of early adopters involved in SOP development (as opposed to SOPs being constructed top-down)	All locations; All topics	Developer survey (single item)	X	X	X
Activities: (Early adopters) Mentor late adopters on system functionalities to enhance course development	Presence of a formal mentorship system for assisting late adopters leverage software capabilities (Y/N)	All locations; All topics	Developer survey + interviews	X	X	X
	Presence of an informal mentorship system for assisting late adopters leverage software capabilities (Y/N)	All locations; All topics	Developer survey + interviews	X	X	X
	% late adopters who report asking early adopters for best practices	All locations; All topics	Developer survey (single item)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: (Early adopters) Mentor late adopters on system functionalities to enhance course development, contd.	% early adopters who report offering advice to late adopters	All locations; All topics	Developer survey (single item)	X	X	X
Activities: Instructors **Metrics answer the question: Are the instructors carrying out the tasked they are designated to carry out?** **So what?: If instructors do not carry out their assigned tasks, course content will not be made available to students in a way that enables them anytime/anywhere access. In addition, the LLC technologies will not be leveraged to make more effective use of class time and instructional strategies (i.e., greater focus on learning the content and achieving higher levels of cognitive processing).**						
Activities: Deliver course content via posting in the LLC	% instructors who use means other than Bb to deliver course content	All locations; All topics (except N/A to CBT-based, "instructorless" topics)	Instructor survey (single item)	X	X	X
Activities: Customize course content based on student feedback and access to Army KM and other resources	% instructors who use BCKS Warrior Knowledge Base or Leader Network to post supplemental course content in Bb	All locations; All topics	Instructor survey (single item) (together w/ the 2 following items, this metric also can be used to examine the relative importance of these resources)	X		
	% instructors who use other Army KM resources (e.g., AKO, CALL) to post supplemental course content into Bb	All locations; All topics	Instructor survey (single item) (together w/ the immediately preceding and following items, this metric also can be used to examine the relative importance of these resources)	X	X	X
	% instructors who use non-Army resources to post supplemental course content into Bb	All locations; All topics	Instructor survey (single item) (together w/ the 2 previous items, this metric also can be used to examine the relative importance of these resources)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Customize course content based on student feedback and access to Army KM and other resources, contd.	Perceived ease of updating course content within the LLC framework	All locations; All topics	Instructor survey (single item)	X	X	X
	Perceived utility of providing feedback to instructor on course content	Resident/satellite/distributed-collaborative; All topics	Student survey (single item)	X	X	X
	% students who gave materials to the instructor to post in Bb	Resident/satellite/distributed-collaborative; All topics	Student survey (single item) + System analysis	X	X	X
Activities: Perform course administrative duties	% instructors who use Bb to communicate expectations to students	Resident/satellite/distributed-collaborative; All topics	System analysis + Instructor survey	X	X	X
	% instructors who use Bb to provide "read ahead" notes for each class (different from curriculum read-aheads)	Resident/satellite/distributed-collaborative; All topics (especially higher-order cognitive)	System analysis + Instructor survey	X	X	X
Activities: Evaluate student progress and report grades to school administrators	% instructors who use Bb to administer course exams	Resident/satellite/distributed-collaborative; All topics	System analysis + Instructor survey	X	X	X
	% instructors who use Bb to provide assessment results to students	Resident/satellite/distributed-collaborative; All topics	System analysis + Instructor survey	X	X	X
	% instructors using Bb to report student grades to administrators	Resident/satellite/distributed-collaborative; All topics	System analysis + Instructor survey	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: (Early adopters) Lead the development of SOPs for leveraging the capabilities of system components (e.g., collaborative capabilities in Bb)	Presence of formal SOPs for leveraging the capabilities of the software applications for course administration and facilitation (Y/N)	Resident/satellite/distributed-collaborative; All topics	Instructor survey + Tech staff survey (single item)	X	X	X
	Presence of informal SOPs for leveraging the capabilities of the software applications for course administration and facilitation (Y/N)	Resident/satellite/distributed-collaborative; All topics	Instructor survey (single item)	X	X	X
	% of early adopters involved in SOP development	Resident/satellite/distributed-collaborative; All topics	Instructor survey (single item)	X	X	X
Activities: (Early adopters) Mentor late adopters on system functionalities to enhance course instruction	Presence of a formal mentorship system for assisting late adopters leverage software capabilities (Y/N)	Resident/satellite/distributed-collaborative; All topics	Instructor survey (single item)	X	X	X
	Presence of an informal mentorship system for assisting late adopters leverage software capabilities (Y/N)	Resident/satellite/distributed-collaborative; All topics	Instructor survey (single item)	X	X	X
	% late adopters who report asking early adopters for best practices	Resident/satellite/distributed-collaborative; All topics	Instructor survey (single item)	X	X	X
	% early adopters who report offering advice to late adopters	Resident/satellite/distributed-collaborative; All topics	Instructor survey (single item)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: CBT/WBT Courseware Production Team **Metrics answer the question: Is the CBT/WBT courseware production team carrying out the tasks they are designated to carry out?** **So what?: If the courseware production team does not carry out its assigned tasks, there will be greater individual differences in the quality of CBT/WBT due to individual differences in instructional design savvy and development capability. In addition, there will be lower average course quality and possibly lower rates of adoption of the LLCs due to unfamiliarity with learning technologies. The LLC must make available quality CBT/WBT to achieve learning effectiveness.**						
Activities: Maintain project teams (instructional designers/analysts, programmers, media specialists) to perform CBT/WBT analysis, design, development, implementation, maintenance, and validation for DL	% proponent CBT/WBT modules analyzed, developed, implemented, and maintained by the courseware production team	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Archival data + Coordination with courseware production team		X	
	% CBT/WBT modules that have been evaluated and validated by LLC courseware production team	DL XXI classrooms and digital training facilities; All MANSCEN topics taught using CBT/WBT at these locations	Archival data (review of validation reports) + Coordination with courseware production team		X	
	Cohesion/coordination of project teams in conducting CBT/WBT analysis, design, development, implementation, maintenance, and validation	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Courseware production team survey + Special purpose measure (observer checklist for reviewing team processes and organizational climate)		X	
	Perceived utility of project teams in CBT/WBT courseware production, maintenance, and validation	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Personnel survey (instructors, curriculum developers, SMEs, and POI managers, where applicable, to include matters of timeliness, efficiency, feasibility, etc.) + Leader interview		X	

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Provide contractual, technical, and educational/quality oversight of contractor-developed CBT/WBT	% proponent CBT/WBT modules developed by outside contractors on which 1 or more members of the courseware production team served as consultants/provided oversight (educational and technical)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Archival data + Coordination with courseware production team		X	
	Perceived utility/effectiveness of consultation/oversight (educational and technical)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Contractor survey (multiple items to include matters of timeliness, quality, relevance, etc.)		X	
	Ratio of time spent between courseware submission to ATSC and acceptance (SCORM conformance and TRADOC 350-70 Regulation conformance) for LLC-overseen CBT/WBT versus non-overseen CBT/WBT (value < 1 indicates time savings in the submission-acceptance process for LLC-overseen CBT/WBT)	All locations (especially distributed); All topics taught using CBT	Archival data + Coordination with courseware production team + Coordination with outside contractors		X	

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Provide contractual, technical, and educational/quality oversight of contractor-developed CBT/WBT, contd.	Perceived quality of contract oversight	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Contractor survey (multiple items to include matters of timeliness, clarity of communication, alignment of expectations, etc.) + Leadership survey (items pertaining to complaints, disputes, lags in contracting)		X	
Activities: Maintain a database of CBT/WBT technologies, capabilities, and techniques	Presence (Y/N) of database containing documentation on CBT/WBT technologies, capabilities, and techniques, CBT/WBT lessons learned, scholarly literature on adult education and educational technology, and lifelong learning strategies	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	System analysis (using a checklist for type of materials present, if database exists)		X	
	% of materials in the database that are current (written within the past 2 years; expectation is for a roughly horizontal distribution)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	System analysis		X	
	% courseware production team members who access database materials (weekly, monthly, prior to new project)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Courseware production team survey + System analysis		X	

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Maintain a database of CBT/WBT technologies, capabilities, and techniques, contd.	% of courseware production team members who regularly (daily, weekly, monthly, etc.) contribute database materials	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Courseware production team survey + System analysis		X	
	Frequency of updates to the database (daily, weekly, monthly, etc.)	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	System analysis		X	
	Perceived accessibility/utility of the database	All locations (primarily distributed); All MANSCEN topics taught using CBT/WBT	Courseware production team survey		X	
Activities: Leadership **Metrics answer the question: Is the leadership carrying out the tasks it is designated to carry out?** **So what?: Without effective leadership, the LLC will fail due to lack of organization, purpose, and support.**						
Activities: Conduct user and stakeholder needs assessment	Formal user and stakeholder needs assessment conducted (Y/N)	All locations; Topics N/A	System analysis + Leader interview	X	X	X
	Stakeholder perceptions of inclusion in the decision-making process	All locations; Topics N/A	Instructor and developer survey (single item)	X	X	X
	Frequency of leader/stakeholder interactions during LLC planning and implementation	All locations; Topics N/A	Leader interview + instructor and developer survey (single item)	X	X	X
Activities: Provide vision	Perceived involvement in the design of his/her proponent's LLC (as opposed to design coming from top-down or strictly bottom-up	All locations; Topics N/A	Leader survey/interview	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Provide vision, contd.	Presence of a leader-developed plan stating the goals and means of his/her proponent LLC	All locations; Topics N/A	System analysis (LLC planning documentation, presence and where located)	X	X	X
	Leader ability to concretely state the goals (end state/effects) to be achieved by his/her proponent's LLC	All locations; Topics N/A	Leader interview	X	X	X
	Leader ability to concretely state the means (key tasks) by which his/her proponent LLC will attain the stated goals	All locations; Topics N/A	Leader interview	X	X	X
Activities: Communicate vision/market LLC concept to stakeholders (including curriculum developers, instructors, courseware developers, technical staff, students, and field Army)	% instructors who understand the "commander's intent" for the LLC	All locations; Topics N/A	Instructor survey	X	X	X
	% curriculum developers who understand the "commander's intent" for the LLC	All locations; Topics N/A	Curriculum developer survey	X	X	X
	% technical staff who understand the "commander's intent" for the LLC	All locations; Topics N/A	Technical staff survey	X	X	X
	% courseware developers who understand the "commander's intent" for the LLC	All locations; Topics N/A	Courseware developer survey		X	
	Presence of shared understanding among stakeholders of the LLC purpose and status	All locations; Topics N/A	Special purpose measure (% agreement among survey responses)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Communicate vision/market LLC concept to stakeholders, contd.	% marketing LLC activities conducted	Distributed-collaborative/distributed-individual (+ non-course locations); All topics	Special purpose measure (checklist of marketing activities, to include mass emails, briefings, advertisements, etc.)	X	X	X
Activities: Procure resources to maintain/update the LLC	Adequacy of funding for LLC	N/A	Leader interview + Personnel interview	X	X	X
	Adequacy of personnel (#s) for LLC	All locations; Topics N/A	Leader interview + Personnel interview	X	X	X
	Adequacy of technology (machines, up-to-date software versions, etc.)	All locations; Topics N/A	Leader interview + Technical staff interview	X	X	X
Activities: Oversee operations/Ensure LLC functionality	Perceived leader effectiveness (instructors)	All locations; Topics N/A	Instructor survey (multiple indicators reflecting effectiveness in consideration/support of instructor needs, overall system functioning, etc.)	X	X	X
	Perceived leader effectiveness (curriculum developers)	All locations; Topics N/A	Course developer survey (multiple indicators reflecting effectiveness in consideration/support of course development needs, overall system functioning, etc.)	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Activities: Oversee operations/Ensure LLC functionality, contd.	Perceived leader effectiveness (courseware production team)	All locations; Topics N/A	Course production team survey (multiple indicators reflecting effectiveness in consideration/support of instructional technology needs, facilitating coordination among managers and instructors/course developers, etc.)		X	
	Perceived leader effectiveness (technical staff)	All locations; Topics N/A	Technical staff survey (multiple indicators reflecting effectiveness in consideration/support of technical needs, overall system functioning, etc.)	X	X	X
Activities: Prioritize limited resources across LLC functions	Periodic assessment of LLC functions conducted (Y/N)	All locations; Topics N/A	System analysis + Leader interview	X	X	X
	Use of assessment results to determine priorities and allocate resources to LLC functions (Y/N)	All locations; Topics N/A	System analysis + Leader interview	X	X	X
Activities: Initiate/organize the development of SOPs for leveraging the capabilities of system components	Organized SOP development process initiated (Y/N)	All locations; All topics	System analysis + Leader interview	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Resources: Money -- Cost per Course (Summed categories equal total cost for all courses) (For cost comparisons, the analogous metrics must be used for the comparison condition.) **Metrics answer the question: What funding is being allocated where to support courses administered via the LLC?** **So what?: Tracking where the money is going is necessary to link expenditures to aspects of LLC success. Such links enable the leadership to make decisions about where to allocate future funding and what effect he/she believes the funding will have on system activity, output, and outcomes. Cost data also are essential to build cost-effectiveness measures.**						
Resources: Estimated costs attributable to a particular course -- Instructor	$ (in K) spent annually on instructor time to teach the course of interest	All locations; All topics	Archival data - Coordination with leadership and support staff; Estimate the % of each instructor's annual time (based on relative number of students taught) spent on preparing, administering, and teaching the course of interest, then calculate this percentage of each instructor's annual salary; Sum across relevant instructors	X	X	X
Resources: Estimated costs attributable to a particular course -- Technical staff	$ (in K) spent annually on technical staff time to support students and faculty during the course of interest	All locations; All topics	Archival data - Coordination with leadership and support staff; Estimate the % of each tech staff member's annual time spent enrolling, monitoring, and supporting the course of interest (based on relative number of students/instructors in each course), then calculate this percentage of each tech staff member's annual salary; Sum across tech staff members	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Resources: Estimated costs attributable to a particular course -- Curriculum developers	$ (in K) spent annually on curriculum developer time to develop curriculum materials for the course of interest	All locations; All topics	Archival data - Coordination with leadership and support staff; Estimate the % of each curriculum developer's annual time spent writing materials for the course of interest (based on the relative amount of new content), then calculate this percentage of each curriculum developer's annual salary; Sum across curriculum developers	X	X	X
Resources: Estimated costs attributable to a particular course -- CBT/WBT Courseware Production Team (instructional designers/analysts, programmers, and media specialists)	$ (in K) spent annually on courseware production team member time to produce (including validation) or oversee the production of CBT/WBT courseware for the course of interest	All locations; MANSCEN topics only	Archival data - Coordination with leadership and support staff; Estimate the % (based on relative number of lessons) of the CBT/WBT courseware production team's annual time spent producing (including validation) or overseeing the development of courseware for the course of interest, then calculate this percentage of the total team salary		X	
Resources: Estimated costs indirectly attributable to a particular course -- Leadership & Administrative	$ (in K) spent on leadership and administrative time to oversee and grow a particular course	All locations; All topics	Archival data - Coordination with leadership and support staff; Divide the total leadership and administrative salary by the number of courses, weighted by course months	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Resources: Estimated information technology costs indirectly attributable to a particular course	$ (in K) spent on hardware used by the course of interest	All locations; All topics	Archival data - Coordination with leadership and support staff; Calculate annual use charge for hardware and software, using proportion of direct costs as an allocation base; a multiplication factor of .33 assumes software has a useful life of 3 years; a multiplication factor of .20 assumes hardware has a useful life of 5 years	X	X	X
Resources: Supplies costs indirectly attributable to a particular course (includes range equipment and supplies, such as ammunition and fuel)	$ (in K) spent annually on supplies used by the course of interest	All locations; All topics	Archival data - Coordination with leadership and support staff; Divide total supplies cost by the number of courses, weighted by enrollment (breakdown by supply type, e.g., range supplies, printing and reproduction, etc., may be necessary, in which case the metric represents the sum of weighted cost proportions across the applicable categories)	X	X	X
Resources: Supplies costs directly attributable to a particular course (e.g., printing and reproduction, includes range equipment and supplies)	$ (in K) spent annually on supplies used only for the course of interest	All locations; All topics	Archival data - Coordination with leadership and support staff	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Resources: Facilities costs indirectly attributable to a particular course	$ (in K) spent on facilities used by the course of interest (facilities costs include the cost to maintain ranges, classrooms, office space, server rooms, lecture halls, etc.)	All locations; All topics	Archival data - Coordination with leadership and support staff; Compute annual use charge for facilities (including furniture and land development), using assignable square feet as an allocation base; a multiplication factor of .02 assumes facilities have a useful life of 50 years	X	X	X
Resources: Personnel **Metrics answer the question: How many people are allocated to which personnel category?** **So what?: Tracking personnel numbers is necessary to link people to aspects of LLC success. Such links enable the leadership to make decisions about where to assign additional personnel and what effect he/she believes that personnel assignment will have on system activity, output, and outcomes.**						
Resources: Technical staff	# technical staff personnel	All locations; All topics	System analysis + Staff interview	X	X	X
Resources: Curriculum developers	# curriculum developers	All locations; All topics	System analysis + Staff interview	X	X	X
Resources: CBT/WBT Courseware Production Team	# CBT/WBT courseware production team members (by job type: instructional designers/analysts, programmers, media specialists, etc.)	All locations; All topics	System analysis + Staff interview		X	
Resources: Instructors	# instructors	All locations; All topics	System analysis + Staff interview	X	X	X
Resources: Leadership & administrative	# leadership and administrative personnel	All locations; All topics	System analysis + Staff interview	X	X	X

Metric Category	Metric	Applicable To (Course location; Course topics)	Data Collection	LVN	MANSCEN	UIT
Resources: Technology, equipment, and supplies **Metrics answer the question: What quantity of technologies, equipment, and supplies is being allocated to the LLC?** **So what?: Tracking resources, especially technology, is necessary to link resources to aspects of LLC success. Such links enable the leadership to make decisions about what additional resources to acquire and what effect he/she believes that resource procurement will have on system activity, output, and outcomes.**						
Resources: Hardware	(server machines, personnel equipment and machines)	All locations; Topics N/A	System analysis + Staff interview	X	X	X
Resources: Software licenses	(Breeze, Sharepoint, Blackboard)	All locations; Topics N/A	System analysis + Staff interview	X	X	X
Resources: Facilities	(housing for server machines and personnel equipment and machines, satellite location facilities, office space, range facilities, etc.)	All locations; Topics N/A	System analysis + Staff interview	X	X	X
Resources: Supplies	(office supplies, range equipment, etc.)	All locations; Topics N/A	System analysis + Staff interview	X	X	X

APPENDIX B
EVALUATION OF THE FORT LEAVENWORTH LIFELONG LEARNING INITIATIVE

Executive Summary

Overview

The Fort Leavenworth Lifelong Learning Initiative (LVN LLI) is a suite of technologies (Blackboard, Microsoft Sharepoint, and Macromedia Breeze) that enables, among other things, online posting of schoolhouse curriculum materials and collaboration (asynchronous and synchronous) among technical staff, students, faculty, and curriculum developers. The primary goal of this blended learning initiative is to provide current, standardized curriculum materials 24 hours a day, 7 days a week, to students located in the schoolhouse, on satellite campuses, at Army reserve facilities, and at personal sites. The LVN LLI also is intended to support two-way collaboration between the field and institutional Army, enabling enhanced course relevance and graduate reachback to the institution.

The purpose of the present evaluation was to capture the effectiveness of the LVN LLI when applied to delivering Intermediate-Level Education (ILE). Specifically, this formative evaluation attempted to define and measure such program outcomes as *enhanced teaching/learning environment*, *enhanced course relevance*, *improved student performance*, and *cost-effectiveness*. Factors theoretically linked to these outcomes--chiefly system use and the activities of instructors, curriculum developers, technical support, and program leadership--also were assessed in order to tell a complete story about the functioning of the initiative. This appendix presents the evaluation in detail, with the main findings summarized immediately below.

Data Collection

Following the completion of a program logic model and metric development, data were collected during the months of September and October 2006 using a variety of methods that included surveys and interviews, system analysis, and retrieval of archival financial and enrollment data. Data collection largely focused on the application of the LVN LLI to ILE conducted in residence at Fort Leavenworth, as this was the focus prescribed by the project stakeholders. Surveys therefore were administered to curriculum developers, instructors, and students directly involved with resident ILE (2006 February-start and 2006 August-start classes; see Appendices B-1, B-2, and B-3 for the surveys and a description of their administration). Some interviews also were conducted with ILE instructors at satellite campuses and at Total Army School System (TASS) Battalion sites.

Findings

Overall, the evaluation results indicate that the LVN LLI is a cost-effective solution for enhancing the educational outreach of ILE curriculum materials. It currently costs approximately $163.14 more per student to deliver ILE using the LVN LLI but the increase in cost due to technology procurement and associated personnel and facilities expenses is a vanishingly small fraction of the total amount spent to deliver ILE. Moreover, the relative cost-per-student to the

Army will further decrease as the printing and shipping of course materials to remote sites is completely phased out over the next two years. For what amounts practically to the same amount of money, ILE delivered online using the LVN LLI is in the process of eliminating the one- to three-year lag in curriculum content between the schoolhouse and Army reserve facilities. It also supports anytime, anywhere learning for ILE students in residence and at satellite campuses, as reflected in system usage data.

Unfortunately, there is relatively little the LVN LLI can do to reduce the 6-10 month lag between changes in the operational environment and revisions to the *standardized* ILE curriculum due to the lengthy institutional curriculum review, revision, and vetting process. However, the LVN LLI may assist in circumventing this problem by making it easier for instructors to supplement curriculum materials with up-to-date articles, professional discussions, and emerging doctrine. Twenty-nine percent of ILE instructors surveyed reported that they supplemented the curriculum materials more frequently than in pre-LVN LLI conditions. This proportion is likely to increase as faculty become more facile with Blackboard. In addition, substantial proportions of students (>85%), instructors (74%), and course authors (80%) surveyed reported that the ILE course content was relevant to the jobs of ILE graduates.

There do appear to be some challenges to the full-scale adoption of the LVN LLI by course authors, instructors, and students in the schoolhouse. Although the rates of active adoption (i.e., primary use of the system components) increased during the first-year pilot, they remain below 100% (between 5% and 40%, depending on the system component and purpose for which it was accessed). A combination of survey and interview data indicated that technical difficulty was not the main barrier to system use. First, a weighted average of student, course author, and instructor survey responses indicated that the LVN LLI technical support was accessible (62%) and useful (66%). Moreover, the system workarounds they reported using involved typically some other form of technology. For example, SharePoint was the most frequently cited alternative to Blackboard when posting or accessing curriculum materials.

The main barriers to system use appear to have been (a) ready availability of alternatives to the system that were more familiar and easier to access; (b) inconsistent or absent information management procedures necessary to make posted content easy to find; and (c) lack of instructor and course author involvement in and buy-in to the lifelong learning concept. As has been found in previous evaluations of this kind (Cianciolo et al., 2006), greater success has been achieved in the technical implementation of the initiative than in the cultivation of stakeholder enthusiasm and investment. When asked what they thought the Army's main reason for implementing Blackboard and Sharepoint was, a minority of students surveyed (33%) responded that the Army had made the decision in the best interests of leader education. Although the Army surely had multiple reasons for adopting the new instructional technologies--including enhancing leader education--actively using the LVN LLI to foster students' perception of organizational support for leaders would make it a more effective asset in enhancing organizational commitment and cultural shift.

In any case, challenges to the active adoption of the LVN LLI did not hamper the academic experience of ILE students and instructors in the first-year pilot. A very high proportion of surveyed students (79% on average) reported that ILE instructors generally

demonstrated the classroom facilitation behaviors recognized as critical to developing adult learners. In addition, survey responses indicated that a majority of students (a) took responsibility for their own learning via independent study (70-98%); (b) reported high learning self-efficacy (88%); and (c) were motivated to learn the topics taught in ILE (91%). Fifty-eight percent of instructors reported that the LVN LLI did not have an impact on classroom efficiency, and a small minority of instructors (10%) reported that the LVN LLI enhanced their classroom efficiency. Although it may seem insignificant, this result is noteworthy given the fact that the introduction of instructional technology often is associated with increased workload for faculty (Willis, 2000).

Conclusions and Recommendations

If nothing about the LVN LLI implementation were to change from this point forward, ILE instruction would continue successfully, and students--especially those at Army reserve facilities--would benefit from greater access to more relevant standardized curriculum, all at relatively little cost to the Army. However, the findings of the present evaluation illustrate the importance of taking a logic modeling approach to understanding the impact of lifelong learning initiatives. Assessment of outcomes alone would have indicated that the LVN LLI had achieved its goals but would have obscured the fact that a subset of these goals--teaching and learning effectiveness--was achieved independently of the use of the LVN LLI's components.

In order for the already successful LVN LLI to achieve optimal educational and organizational impact, stronger beliefs in its purpose and higher active adoption rates of its components should be achieved. The accomplishment of this goal requires fostering the instructor buy-in necessary to learn and adopt unfamiliar technologies and to role-model their use for students. Improved buy-in may be developed through (a) engaging other schoolhouse components, especially faculty and staff development, in viewing and cultivating LVN LLI-assisted teaching as a critical instructor competency; (b) encouraging and shepherding the involvement of instructors and course authors in the development of information management procedures through needs assessment and iterative system design; and (c) spreading strategic communications that explain the purpose and goals of the system, that anticipate technical limitations of the system (i.e., login requirements), and that immediately follow system outages.

Overview of the Fort Leavenworth Lifelong Learning Initiative

The Fort Leavenworth Lifelong Learning Initiative (LVN LLI) was designed to support the educational mission of the U.S. Army Command and General Staff College (CGSC). The CGSC is one of the major subordinate organizations comprising the Combined Arms Center headquartered at Fort Leavenworth, and provides formal institutional education to field grade and higher officers through five component schools. Figure B-1 shows the organizational chart of the CGSC, adapted from *CGSC Circular 350-1*. The components of the CGSC directly relevant to the present evaluation are shown in orange, and their connection with the LVN LLI will be explained in further detail below.

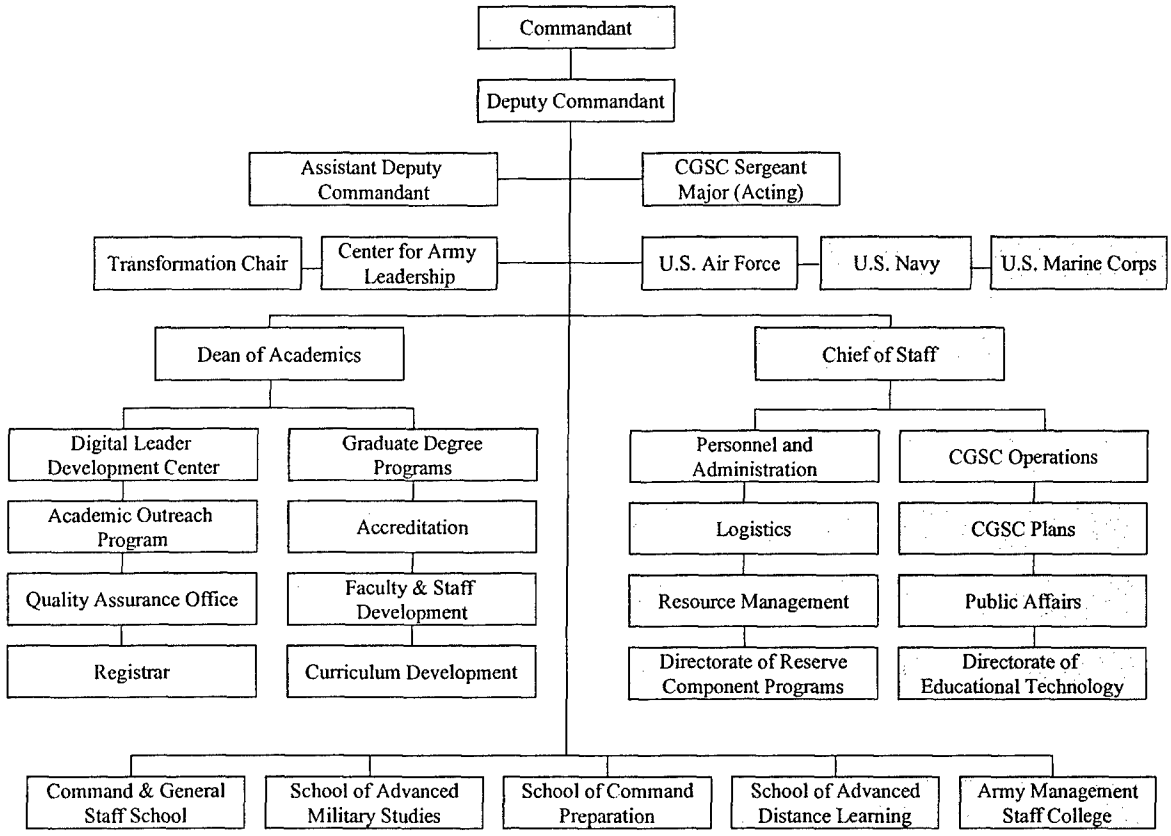

Figure B-1. CGSC Organizational Chart

The Components of the LVN LLI

Technology procurement and integration for the LVN LLI began in 2004, and at the time of this evaluation the initiative comprised three major components: Blackboard, Microsoft SharePoint, and Macromedia Breeze. Each of these components, described below, was selected to provide a unique capability in supporting the development of curriculum materials, the delivery of course content, the collaboration among faculty, staff, and students, and the storage of curriculum materials for reachback from graduates in the field.

Blackboard. The Blackboard Academic Suite is a web-based platform designed to organize and host a wide variety of file types typically distributed in educational settings, including (but not limited to) digital documents, presentations, and videos. Blackboard also provides a means for faculty to communicate with students via posting announcements and sending group emails and to conduct such classroom administrative tasks as administering exams, collecting assignments, and recording grades. Students may also communicate with each other using Blackboard's discussion board. Blackboard is especially well suited for conducting asynchronous collaborative distance-learning courses, such as those provided by many universities, and for conducting blended-learning courses in which one component involves asynchronous distance learning. Online posting of course content also reduces the time and money involved in replicating and shipping curriculum materials to multiple class sites, a benefit of particular relevance to the CGSC.

Microsoft SharePoint. A combination of Microsoft Windows server technology and access privileges, SharePoint enables the intranet-based storage and management of large, complex file collections. SharePoint users with the appropriate permissions and access to an organization's domain can create websites ranging in complexity to host and organize content, post announcements, create and maintain message boards, and send emails, among other things. SharePoint is intended to support asynchronous collaboration among curriculum developers by making working draft files and reference information available in a way that is easy to locate and understand. SharePoint also is intended to support collaboration among students, to distribute general reference materials (e.g., emerging doctrine) and to connect students administratively to the schoolhouse.

Macromedia Breeze. Breeze is a web-conferencing platform that enables synchronous collaboration through such capabilities as document sharing, voiceover IP, multiple-person video, and an electronic whiteboard. Breeze was included in the LVN LLI in large part to enable advanced user technical support and to enable distributed academic activities, such as instructor or course author meetings and virtual classroom presentations and group exercises. At the time of this research, Breeze was in the preliminary stages of implementation in the LVN LLI, so it is not addressed further in this report.

Implementation, maintenance, and oversight of the LVN LLI are conducted by the CGSC Directorate of Educational Technology (DOET; highlighted in orange in Figure B-1 above). The DOET comprises 18 staff members whose efforts are devoted to providing the information technology necessary to support the CGSC's educational mission, which includes classroom and office networking and automation in addition to the LVN LLI. With the Lewis and Clark Building--which will house CGSS and much of the CGSC administration and support, including the DOET--under construction, the DOET also is heavily involved in planning, procuring, and overseeing the incorporation of advanced information technology into over 365,000 square feet of brand new classrooms, offices, and auditorium space. Eight additional staff members, on-site contractors, are devoted entirely to the LVN LLI, providing technical support, technology integration, and user training.

The LVN LLI and Officer Education

Shown at the bottom of Figure B-1 (above) are the five schools comprising the CGSC. Highlighted in orange to indicate their direct relevance to the present evaluation are the Command and General Staff School (CGSS) and the School of Advanced Distance Learning (SADL). Together, these two schools deliver the common core or Intermediate-Level Education (ILE) component of the Command and General Staff Officer's Course (CGSOC). The CGSS delivers ILE to students in residence at Fort Leavenworth and to students attending satellite campuses located at Forts Belvoir, Gordon, and Lee. The SADL develops, distributes, and administers classroom-based ILE to students attending instruction via Total Army School System (TASS) Battalion sites and self-contained, web/CD-based ILE instruction to non-resident students completing their coursework in other locations. The present evaluation focused on the administration of ILE using the LVN LLI because at the time the study was conducted, ILE was the major course supported by the initiative. The CGSC is in the process of implementing other courses online, such as those administered by the School of Advanced Military Studies.

The ILE curriculum predates the LVN LLI by approximately two years. First piloted in 2003, the purpose of ILE was to make third tier officer education available to all Army majors in a manner best suited to their career field (Bralley, 2006; Bralley, Danley, French, Soby, & Tiberi, 2003). Prior to ILE, 50% of Army majors were selected to attend the 10-month CGSOC at Fort Leavenworth. The selected majors came from a variety of career fields, however a substantial portion of the CGSOC curriculum was relevant only to a subset of these officers. Majors in the Operations Career Field benefited from the complete curriculum, but majors in other career fields (e.g., the Institutional Support Career Field) found only the common core component to be relevant to their educational needs. Enabled by the satellite campuses and advances in distance learning technology, ILE is an efficient and cost-effective solution for ensuring educational outreach. Majors in the Operations Career Field attend the full 10-month course at Fort Leavenworth, while majors in the other career fields complete only the CGSOC common core curriculum (i.e., ILE), lasting approximately sixteen weeks, at one of the satellite campuses or via distance education (Bralley, 2006; Bralley et al., 2003).

As shown in Figure B-2 below (adapted from *CGSC Circular 350-1*), the ILE curriculum is taught in two parallel sequences of blocks of instruction punctuated by periodic visits by guest speakers to CGSC. All ILE students, regardless of their course location, receive this same basic curriculum, although the structure and duration of the course differs somewhat for distance learners, and guest lectures must be attended remotely or asynchronously by students located off-post.

Standardized curriculum materials for ILE are developed by teams of lesson authors grouped according to block of instruction. Block authors lead a team of lesson authors, ensuring that the content developed is accurate and coherent. Curriculum revisions made following an administration of ILE go through a rigorous development process that begins with recommendations gathered from a post-instructional conference. A curriculum design review involving the college leadership precedes the revision process then, prior to distribution to students, revised ILE curriculum materials undergo an institutional review process whereby accuracy is further checked and instructional effectiveness examined.

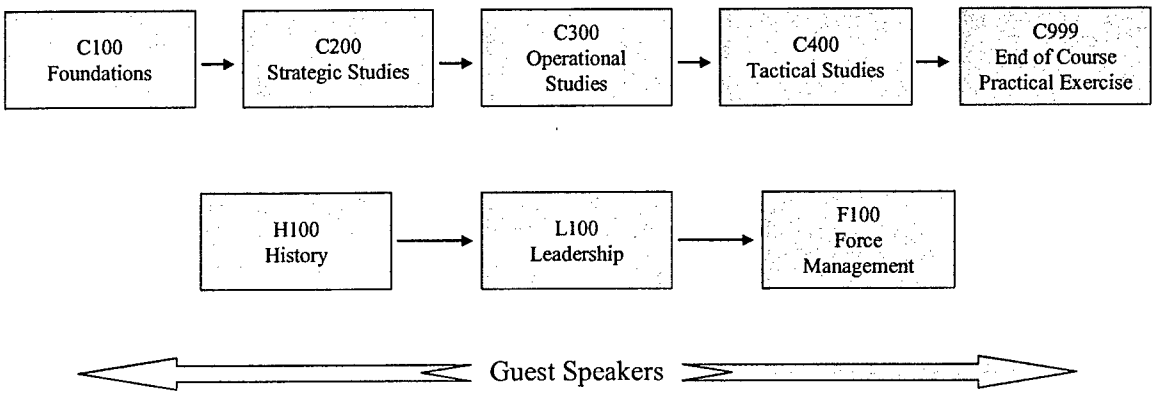

Figure B-2. ILE Curriculum

ILE students in residence at Fort Leavenworth and at satellite campuses are divided into sections of approximately 72 students, which are in turn divided into four staff groups comprising approximately 18 students. Each section is taught by 12 instructors coming from each of five departments within CGSS: Tactics (4 instructors), Joint and Multinational Operations (4 instructors), Logistics and Resource Operations (2 instructors), Military History (1 instructor), and Leadership (1 instructor). Staff groups contained in a section have one instructor from each department such that a section's four tactics instructors each have responsibility for a single staff group whereas a section's single military history instructor has responsibility for all four staff groups, and so on.

Producing and Delivering ILE with the LVN LLI – Use Cases

ILE Curriculum Development. SharePoint is used in the LVN LLI to store and manage ILE curriculum content during the development process. Block authors are encouraged to use SharePoint to coordinate with each other and with lesson authors so that content is not unnecessarily duplicated and so that general educational themes (e.g., critical thinking) common across blocks may be reinforced in topic-relevant ways. Block authors have permissions to create and modify SharePoint websites to coordinate their team's efforts.

Prior to the implementation of the LVN LLI, ILE curriculum materials under development were stored on an internal network and block authors created file systems to organize content. Replacing the internal network with SharePoint enables block authors and lesson authors to work together using a central information management resource even when they are geographically distributed on- and off-post. The SharePoint site also links curriculum developers to a variety of knowledge management resources, including the Battle Command Knowledge System discussion forums and Army Knowledge Online (AKO), so that information directly from the field is readily available and can be used to enhance the currency and relevance of course content.

ILE Instruction. The intended use for Blackboard is to deliver standardized ILE curriculum materials to students located on- and off-post. Secured by AKO authentication, content posted on Blackboard is accessible anytime, anywhere by students and faculty with the

appropriate permissions. Because the curriculum development and review process creates a gap of several (up to 10) months between the initiation of the process and content delivery, ILE instructors are encouraged to supplement the formal curriculum with material they identify as more relevant or current. Instructors supplementing the formal curriculum may locate materials using readily available links to Army knowledge management resources. They are directed to post their content on Blackboard and to alert students to new materials. Instructors also are encouraged to use the administrative functions present in Blackboard, particularly the grade book, to facilitate classroom activity.

Prior to the implementation of the LVN LLI, instructors distributed curriculum materials via an internal network and via print. Access to course content therefore was restricted to people on post who could access computers on the network, unless substantial printing expenses were incurred to facilitate home study. Remote ILE students also received curriculum materials in printed form and, more recently, via compact disc. Posting course content in Blackboard instead of on an internal network enables access to course content from anywhere. Web-based access to course content not only enables the delivery of standardized course content across modes of delivery (resident, satellite, TASS Battalion, etc.), but eliminates the need for printing and shipping to remote sites. Eliminating printing and shipping simultaneously reduces cost and enhances curriculum currency for students off-post because the lead time to reproduce and distribute course materials is significantly reduced.

Student collaboration. In addition to supporting collaboration among curriculum developers, SharePoint also is used to support ILE student collaboration and connection to the schoolhouse. The student SharePoint site features such resources as reference libraries and links, academic calendars, and announcements from a variety of sources, including the deputy commandant and the CGSC student division. Students with the appropriate permissions may create shared workspaces on the site to post their contributions to class discussions, group projects, and/or practical exercises. Enabling collaboration within a protected domain facilitates information assurance in an environment where a large number of people may post content. Unlike in SharePoint, students do not have permissions to post content to Blackboard so that access controls may promote information assurance.

Metrics and Measures Used to Evaluate the Leavenworth LLI

The purpose of the evaluation was to capture the learning effectiveness of the LVN LLI. The goal of this evaluation was to represent the cost-benefit tradeoffs of the emerging initiative in a way that would be easy for decision makers to understand and use. Specifically, this formative evaluation attempted to define and measure such outcomes as enhanced teaching/learning environment, enhanced course relevance, improved student performance, and cost-effectiveness. Factors theoretically linked to these outcomes, chiefly system use and the activities of instructors, curriculum developers, technical support, and leadership, also were assessed in order to tell a complete story about the functioning of the initiative.

Of the 229 metrics listed in the metric and measures chart (see Appendix A, above), 17 were selected by the CGSC DOET as being particularly relevant to capturing the costs and benefits of the LVN LLI. Eight of these metrics were activity metrics, three were output metrics,

and six were outcome metrics. No resource metrics were selected. Additional resource, activity, and outcome metrics from the metrics and measures chart were used to supplement the 17 selected because they (a) would provide useful diagnostic and outcome information; (b) were necessary for capturing cost-effectiveness; and (c) were feasible to capture in the time available.

Evaluation data were collected in September and October of 2006 via a combination of interviews, surveys, and retrieval of archival financial and other data. Data collection largely focused on the application of the LVN LLI to *resident* ILE, as this was the focus prescribed by the project stakeholders. Surveys therefore were administered to curriculum developers, instructors, and students directly involved with resident ILE (2006 February-start and 2006 August-start classes[2]; see Appendices B-1, B-2, and B-3 for a complete description of the surveys and their administration). All metrics used in the present evaluation and their associated measures are described below.

Outcome - Course Relevance

Six metrics capturing the relevance of the ILE curriculum materials (formal and informal) were measured. These metrics were selected in order to explore a key expected outcome of the LVN LLI -- that course content would be more relevant because (a) curriculum developers would have easier access to the field Army and to each other, enabling more frequent updates to standardized curriculum materials; (b) instructors would have more flexibility to insert supplemental materials into the curriculum in real time, enabling more frequent updates; and (c) placing content online would eliminate replication and shipping timelines. A detailed description of each metric is provided below.

1. Frequency of curriculum developer updates to main curriculum relative to the pre-LVN LLI situation. As described previously, formal decisions to update the main, standardized ILE curriculum follow a post-instruction conference and curriculum design review. Course authors then implement these decisions, ideally completing the production and editorial process before the next cycle of the course. Course authors were asked to report via survey how frequently they updated the main ILE curriculum (relative to course cycles) based on current events or feedback in past years, then were asked to report the impact that SharePoint has had on the frequency of such updates. Eight of 9 course authors who reported on curriculum updating indicated that in the past they infrequently or never updated the curriculum. Seven of the 9 course authors also indicated that SharePoint had not had an impact on the frequency of updating--that the duration of the curriculum development and review process, rather than technical factors determined the frequency of revisions.

2. Curriculum developer perceptions of main curriculum relevance. Course authors were surveyed to capture their perceptions of the relevance of the standardized curriculum materials. A single question asked how current or relevant they felt the curriculum was to the jobs of ILE

[2] The first full-scale pilot of the LVN LLI with resident students was conducted with the 2006 February-start ILE class with follow-on implementation executed for the 2006 August-start class. Some initial piloting was done with the 2005 August-start ILE class, but this pilot effort was a scaled-down version of the 2006 February-start pilot and also was completed prior to the beginning of the present evaluation.

graduates. Of the 10 curriculum developers who responded to this question, 8 indicated that the curriculum content was either totally relevant or more relevant than in previous years.

3. Frequency of instructor updates to ongoing course materials. As described previously, the standardized ILE curriculum posted on Blackboard in the LVN LLI can be up to 10 months behind changes in the contemporary operating environment. To enhance the currency of course materials, instructors may use Blackboard to distribute news articles, professional literature, or emerging doctrine, among other things, just in time to replace older readings or support class discussion. The frequency of such updates was assessed by asking instructors how often they made them: daily, weekly, every couple of weeks, monthly, and never. Of 69 instructors who responded to this survey question, 64% reported updating daily or weekly.

4. Frequency of instructor updates to ongoing course materials relative to the pre-LVN LLI situation. This metric was captured by asking instructors to indicate how frequently they supplemented the standardized curriculum during the 2006 February- and/or 2006 August-start classes, taught using the LVN LLI, relative to previous ILE classes for which an internal network was used to distribute course content. Of the 63 instructors who responded to this survey question, 29% ($N = 18$) reported making updates somewhat or a lot more frequently than in previous situations. Fifty-six percent (35 of 63) reported that their frequency of updates was approximately the same.

5. Instructor perceptions of course relevance (main and supplemental content). Instructors were surveyed for their perceptions of the relevance of the standardized and supplemental curriculum materials. A single question asked how current or relevant instructors felt the main and supplemental curriculum was to the jobs of ILE graduates. Of the 65 instructors who responded to this question 42% ($N = 27$) stated that the curriculum was totally relevant or definitely more relevant than in the past. Thirty-two percent (21 of 65) stated that the curriculum was relevant but that emphasis is rightly placed on education, rather than mission preparation.

6. Student perceptions of course relevance (main and supplemental content). Students were surveyed to capture their perceptions of the relevance of the main and supplemental curriculum materials. Two questions asked how current or relevant students felt the main and supplemental curriculum was to the jobs they expected to assume after graduation. Of the 251 students who responded to these questions, 73% ($N = 184$) felt the *main curriculum* was either more relevant than irrelevant or totally relevant to the jobs they expect to have after graduating. An additional 16% of respondents ($N = 40$) indicated that the formal curriculum was relevant, given the fact that institutional education was supposed to be "just-in-case," not "just-in-time." Sixty-six percent of surveyed students ($N = 165$) felt that the *supplemental content* was either more relevant than irrelevant or totally relevant. An additional 22% of respondents ($N = 54$) indicated that the supplemental content was relevant, given its academic purpose.

Summary. Ideally, the opportunity to update standardized ILE curriculum materials would occur before each course administration. Updating the curriculum this frequently would enable the institution to deliver education as adaptively as possible to changes in the operational environment. There is significant difficulty associated with updating the curriculum this often, namely the length of the curriculum review, revision, vetting, and printing process relative to the

number of overlapping course administrations. Simply put, the ILE course administration cycle outpaces the curriculum development cycle. The result is that standardized ILE curriculum materials delivered to August-start resident students are 6 to 10 months behind the changes to the current operating environment. Non-resident course administrations (i.e., at TASS Battalions) are even further behind--up to three additional years--in part due to the time required to print or replicate and ship course materials throughout the U.S. and internationally.

Unfortunately, the LVN LLI cannot change the speed of the formal curriculum review, revision, vetting, and printing process. That said, substantial proportions of students (>85%), course authors (80%), and instructors (74%) surveyed reported that the ILE course content was relevant to the jobs of ILE graduates. It is unknown how pre-LVN LLI ratings of ILE course relevance would compare to those obtained in the present evaluation. However, 29% of instructors surveyed reported that they supplemented the curriculum materials more frequently than in pre-LVN LLI conditions, and 56% reported making approximately the same number of updates in both conditions. Importantly, when fully implemented and adopted, the LVN LLI will eliminate the one-year discrepancy in ILE content currency between TASS Battalion sites and the CGSS due to the replication and shipping timelines required to produce and distribute course content remotely.

Outcome – Instructors as Facilitators of Adult Learning

Three metrics capturing the degree to which ILE instructors leveraged the LVN LLI blended learning environment (i.e., the combination of face-to-face and asynchronous collaborative learning settings) to facilitate adult learning were measured. Proponents of technology-assisted learning claim that technology can revolutionize the way education is conducted, but instructors must leverage the available capabilities to achieve an impact on student learning and lifelong learning orientation (e.g., Clark, 1994; Ehrmann, 1994). The purpose of the selected metrics was to explore whether the presence of the LVN LLI (specifically, Blackboard) has had an impact on how instruction and learning is accomplished in ILE. A detailed description of each metric is provided below.

1. Percent of students who reported that they were encouraged to contribute materials to the course curriculum. Students were asked to report via survey whether any of their instructors encouraged them to contribute to the course content in their respective areas of expertise. The range in possible answers included "no encouragement," "no discouragement," and "active encouragement." Of the 251 students who responded to the survey question, 74% ($N = 186$) indicated that instructors actively encouraged contributions. Sixty-eight percent of February-start students (54 of 80) reported active encouragement, whereas 78% of August-start students (131 of 169) made the same report.

2. Percent of students who reported that instructors encouraged them (or demonstrated how) to use resources other than him/herself for class work or other purposes. Students surveyed were asked to report whether any of their instructors encouraged them to consider learning resources in addition to him- or herself. Respondents could select "no encouragement," "no discouragement," and "active encouragement." Of the 250 students who responded to the survey question, 65% ($N = 163$) indicated that instructors actively encouraged the exploration of

alternative learning resources. Roughly equal proportions of February-start and August-start students reported active encouragement [67% (53 of 79) and 65% (109 of 169), respectively].

3. Quality of real-time instructor facilitation behaviors in the classroom. This metric was captured through a five-part survey question in which students were asked to report the relative number of instructors who engaged in five classroom facilitation behaviors. These behaviors included: (1) provided clear guidance regarding expectations and performance evaluation criteria; (2) provided constructive and informative performance feedback; (3) presented learning challenges that were difficult but not overwhelming; (4) assigned group tasks that had well-defined tasks and roles for each group member; and (5) engaged students in asking questions and reflecting on class materials. Table B-1 below summarizes student responses to this question.

Table B-1. Student Reporting of Instructor Classroom Facilitation Behavior

Facilitation Behavior	$N_{respondents}$	% Reporting at least "more did than didn't"		
		All	Feb-start	Aug-start
Guidance	250	86%	78%	90%
Feedback	249	79%	71%	83%
Challenge	247	79%	71%	82%
Group	250	79%	68%	84%
Questions	250	89%	81%	92%

As shown in the table above, a substantial proportion of students reported the presence of several instructor facilitation behaviors in the classroom. Notably, this proportion was higher for 2006 August-start students on all behaviors, suggesting that instructors developed as facilitators of adult learning between the two cycles of the course. This interpretation should be viewed with caution, however, because August-start students had only recently begun classes when surveyed whereas the February-start students were close to graduating. The data collected cannot rule out the possibility that the difference shown in the table above was due to such group differences as level of fatigue or habituation to the course and/or reliance on short-term versus long-term memory to make judgments.

Summary. A very high proportion of surveyed students (79% on average) reported that ILE instructors generally demonstrated the classroom facilitation behaviors recognized as critical to developing adult learners. It is unknown whether this proportion would be the same for students who took ILE prior to the launch of the LVN LLI. However, the pattern of responding suggests that ILE instructors improved their facilitation skills between the 2006 February- and 2006 August-start course cycles. On all but one of the facilitation behaviors sampled, a greater proportion of August-start students reported a higher frequency of instructor facilitation. Although alternative explanations for this pattern cannot be ruled out, the finding could indicate that adoption of the LVN LLI is having an effect on instructional quality. A more in-depth evaluatuion of classroom facilitation behavior involving actual classroom observation across course cycles is warranted.

Outcome – Presence of Learning Community

The emergence of a community of learners is believed to be both an outcome of successful blended learning and a key determinant of lifelong learning orientation. Lifelong learners rely on the support of the learning community to acquire information and test ideas, among other things (Haythornthwaite, 2002; Wellman et al., 1988). Seven metrics were developed to capture learning community, but only one was measured in the present evaluation due to time constraints and emphasis on other metrics of more immediate interest to project stakeholders. This metric was selected because it directly addresses the use of a LVN LLI component (SharePoint) in enabling community support for learners.

1. *Presence (Yes/No) of a student leader using SharePoint or other means to collaboratively organize student efforts (due date lists, class calendar, etc.).* Students were surveyed to determine whether there was a student leader in their staff group who used SharePoint to coordinate student efforts. Of the 250 students who reported on student leaders, 57% ($N = 144$) indicated that their staff group had a student leader (appointed or emergent) who used SharePoint to coordinate. Thirty-six percent ($N = 89$) indicated that there was a student leader, but that he or she did not use SharePoint to coordinate. The proportion of student leaders using SharePoint was greater for August-start students than for February-start students [64% (101 of 159) and 58% (42 of 72), respectively].

Outcome – Student Responsibility for Own Learning

Four metrics were selected to capture the degree to which ILE students had taken responsibility for their own learning process. Instruction designed to facilitate the adult learning process, enabled by a blended learning environment with easy access to web-based resources and expert communities, should lead to increased resourcefulness on the part of students as they begin to see themselves as active agents in their own learning (McLoughlin & Oliver, 1999; Sherry & Wilson, 1997) The purpose of the selected metrics was to explore whether students leveraged the LVN LLI to conduct independent evaluation in ILE. A detailed description of each metric is provided below.

1. Percent of registered students who used Battle Command Knowledge System (BCKS) Leader Network to supplement course materials, complete assignments, or for own research. This metric was captured by asking students to indicate via survey how important BCKS was to them when searching for current information to complete class assignments or conduct independent research. Students were asked to indicate the importance of the BCKS Leader Network relative to other KM resources. Seventy-five students (30%, 75 of 249) reported that they did not search for current information. Of the remaining 174 students who responded to this survey question, 30% ($N = 52$) indicated that they used BCKS as much or more than other (Army and non-Army) KM resources.

2. Percent of registered students who used other Army KM resources (including SMEs and other forums) to supplement course materials, complete assignments, or for own research. Similar to the previous metric, students were asked to report on the relative importance of Army KM resources (excluding BCKS, e.g., AKO, Center for Army Lessons Learned, etc.) when

completing class assignments or conducting independent research. Twenty-seven students (11%, 27 of 250) reported that they did not search for current information. Of the remaining 239 students, 60% ($N = 144$) indicated that they used Army KM resources as much or more than BCKS or non-Army resources.

3. Percent of registered students who used non-Army resources to supplement course materials, complete assignments, or for own research. As above, this metric was captured using a single survey question in which students were asked to indicate the importance of non-Amy KM resources relative to Army KM resources (including BCKS) when searching for current information to conduct academic activity. Five students (2%, 5 of 251) reported that they did not search for current information. Of the remaining 246 students, 96% ($N = 236$) indicated that they used non-Army KM resources as much or more than Army KM resources.

4. Percent of registered students who accessed a particular Blackboard page prior to when the corresponding class/lesson was held. A single survey question was used to capture this metric. Students were asked to report how frequently (never, sometimes, often, always, and N/A) they accessed course content in Blackboard prior to a class meeting in order to prepare. Of the 249 students who responded to this survey question, 9% ($N = 23$) indicated that their staff group did not have content posted on Blackboard, so they did not access it prior to class. Of the remaining 226 students, 55% reported that they often or always used access to Blackboard to prepare for class.

Summary. A fairly high proportion of students (between 70% and 98%) reported using knowledge management (KM) resources to search for current information to conduct academic activity, indicating that students are taking charge of their own learning. Most students who conducted searches (82%) used non-Army resources alone or more than Army resources, however, so it is unclear whether the LNV LLI in specific has had an impact on student resourcefulness. Fifty-five percent of students whose course materials were posted in Blackboard (9% claimed that their course materials were not posted in Blackboard) reported that they accessed the LVN LLI prior to class in order to prepare. This finding suggests that access from outside the schoolhouse is being used to support student performance in the absence of printed materials distributed by the college.

Outcome – Learning Self-Efficacy

Learning self-efficacy is believed to be an important outcome of any learning experience, regardless of whether it is technology-supported (e.g., Abell, 2003). The assumption behind assessing learning self-efficacy in the present evaluation was that high levels of learning self-efficacy would reflect the successful application of technology to the learning environment. In other words, they would reflect that the introduction of technology did not interfere with self-efficacy and that the technology could support levels of self-efficacy that are consistent with an external criterion. Learning self-efficacy has only one corresponding metric in the metric chart (see Appendix A), which was assessed in the present evaluation.

1. *Percent of students who reported that they were capable of leading their own learning process.* Students were asked via survey to report how capable they felt of leading their own

learning. Students had the option of indicating whether they had the opportunity to lead their own learning or if students should lead their own learning. Respondents having the opinion that students should be able to lead their own learning had the option of indicating how well they believed they accomplished their learning goals. Of the 250 students who responded to this survey question, only one felt that students should not lead their own learning. Of the remaining 249 students, 88% ($N = 222$) indicated that they had accomplished (February-start) or were accomplishing (August-start) most or all of their learning goals during ILE. This high proportion of students, which was largely the same for the February- and August-starts, suggests that the instructional technologies comprising the LVN LLI are not preventing high levels of learning self-efficacy, although it is unknown to what degree the technologies may help foster this orientation or to what degree students goals' for their own learning match those of the educational institution.

Outcome – Motivation to Learn

As with learning self-efficacy, motivation to learn is a critical outcome of any learning situation, especially for adult learners for whom education is not compulsory (Abell, 2003). Technology supported learning environments should not reduce motivation to learn, and may even enhance motivation, if the technology is easy to access and well-designed. Learning technology also may affect motivation indirectly through increased alignment of course content with operational demands (i.e., enhanced course relevance). There is only one metric in the completed metric chart that is associated with motivation to learn (see Appendix A), and it was assessed in the present evaluation.

1. *Percent of students who reported that they were motivated to learn subjects addressed by the courses they took.* Students were surveyed to assess their motivation to learn the subjects taught in ILE. A single question allowed students to indicate their level of motivation as a function of content relevance and instructor attitudes. Of the 251 students who reported their motivation to learn, 91% ($N = 228$) indicated that they felt generally (69%, $N = 172$) or highly (22%, $N = 56$) motivated (i.e., that course content spoke to their interests and that instructors were engaging). Although it is impossible to tell from these data what positive impact the LVN LLI has on ILE students' motivation, it is clear that a large proportion of ILE students surveyed were motivated to learn. This finding suggests that a negative impact probably did not occur.

Outcome – Enhanced Instructional Efficiency

Of the three metrics for instructional efficiency listed in the metric chart, only one was selected for the present evaluation due to time limitations and the irrelevance of one of the metrics to the LVN LLI. The selected metric was chosen over the other relevant metric because it more directly reflects the impact of the educational technology introduced via the LVN LLI. Specifically, the LVN LLI may enhance classroom efficiency by reducing the amount of teaching time spent doing administrative tasks. Blackboard enables instructors to make announcements, distribute handouts, collect homework, and administer exams, among other administrative tasks, all outside of the classroom setting.

1. *Estimated reduction in time spent in classroom doing administrative tasks, including announcements, handouts, and testing.* In a single survey question, instructors were asked to estimate how much classroom time spent on administrative tasks was reduced (relative to pre-LVN LLI situations) by using Blackboard. Of the 69 instructors who responded to this question, 10% ($N = 7$) indicated that using Blackboard to conduct administrative tasks reduced their classroom administration time and 58% ($N = 40$) reported no change in classroom administration time.

Outcome – Enhanced Organizational Commitment

Affective organizational commitment is a component of individual readiness and perceptions of organizational support are a critical determinant of this commitment that can be affected directly by organizational initiatives (McGonigle et al., 2005). Of the five metrics developed to capture the effect of Lifelong Learning Centers on perceptions of organizational support, only one was selected for measurement in order to manage the scope of the survey administered to ILE students and to focus the evaluation on topics of immediate interest to stakeholders.

1. *Percent of users who reported feeling that the LVN LLI reflected the Army's intent to support the warfighter.* Currently comprising the vast majority of users of the LVN LLI, ILE students were surveyed to assess the effect of the LVN LLI on perceptions of organizational support. Students were asked what they thought to be the main reason why the Army decided to administer ILE using Blackboard and SharePoint. Students could identify financial, political, educational, unknown, or other motives for the change. Student suggestions for other motives for the change were reviewed for their alignment with the given motive categories, and were in some cases re-assigned if a close match was determined. For example, responses indicating that the reason for Blackboard and SharePoint was that the Army wanted to advance educational technology were recoded as educational in nature. Similarly, if a response referred to making paper projects digital, it was recoded as financial in nature. Responses suggesting that the Army had decided to use Blackboard and SharePoint to keep up with civilian universities or to move the Army distance learning program along were not recoded.

Of the 251 students who reported their opinion regarding the Army's motives, 33% indicated that they believed the Army's motives were educational in nature and in the best interests of leader education. Twenty-five percent of February-start students (20 of 80) selected educational motives, whereas 37% of August-start students (63 of 169) selected the same. This finding suggests that the LVN LLI currently does not serve to reinforce the majority of students' perceptions organizational support. For this reason, it may have limited impact on affective organizational commitment. The proportion of students for which the LVN LLI may influence perceptions of organizational commitment appears to be increasing, however, alternative explanations for this trend (i.e., the point in the academic program at which students were surveyed) cannot be ruled out.

Outcome – Cost-Effectiveness

Of the six cost-effectiveness metrics presented in the metric and measures chart, one was selected for the present evaluation--a comparison of the cost per student to deliver ILE using traditional means versus the LVN LLI. The comparison cases used to build this metric were the first full pilot year of the LVN LLI (February 2006 to present, including all student types) and the two pilot years of the ILE curriculum change from the traditional CGSOC (2003-2004 and 2004-2005, all student types).

An analysis of the cost per student of a blended learning initiative must reflect the costs associated with distributing course materials as well as those costs associated with producing the curriculum content and providing instruction and course administration (e.g., enrollment, record keeping, etc.; see Cukier, 1997; Levin, 1986). This approach is followed regardless of the means used for accessing course materials (i.e., classroom, video teleconference, web-based content repositories, etc.). A cost accounting approach that goes beyond instructional technology is necessary because a complex of interrelated expenses comprises the total cost of education, including (a) direct personnel, supplies, and other costs, including printing and shipping of course materials; (b) indirect support costs, such as facilities and maintenance, administrative staff, faculty development, etc.; and (c) opportunity costs. Indeed, the cost of technology to support a blended learning initiative is a relatively minor expense compared to the other expenses involved in education (Levin, 1986).

The fiscal promise of blended learning--and the LVN LLI in particular--is that it will reduce printing and shipping costs for course materials (and perhaps eventually travel and housing costs for students), although a corresponding increase in technology-related costs also is expected. In order to understand the cost-effectiveness of the LVN LLI in the context of providing ILE to all Army majors, the financial tradeoff involved in placing course materials on the web must be considered as a proportion of bigger picture expenses. Presenting comprehensive cost data not only allows decision makers to keep educational technology costs in perspective but also allows decision makers to determine what future efforts should have the greatest impact on the cost of education.

Cost per student for administering ILE in the LVN LLI vs. using traditional means. To develop a robust cost per student comparison metric, best practices in cost accounting for higher education and technology-supported learning were applied (Cukier, 1997; Hyatt, 1983; Levin, 1986; Middaugh, 2000; Milam, n.d.). Briefly, these cost accounting methods require capturing the direct and indirect costs allocated to education delivery. Direct costs include personnel salaries and benefits, supplies, travel, and other directly allocable expenditures, such as contracts and printing and shipping costs. Indirect costs are broken down into annual, variable expenditures (i.e., costs associated with institutional support, such as facilities maintenance and faculty and staff development) and annual use charges associated with fixed expenditures (i.e., buildings and information technology).

Ideally, all costs, no matter how seemingly trivial, would be accounted for when developing the cost per student metric. There was limited time to collect financial data in the present effort however, so decisions were made to manage the scope of the work while

producing a reasonable reflection of (a) change in cost per student across mode of content delivery; and (b) change in cost per student as a proportion of total cost. The criteria for including/excluding cost data from the analysis were relevance to project sponsors, immediacy of involvement in ILE delivery, presence in CGSC financial reporting, and data availability.

A summary of inclusions and exclusions is presented in Table B-2 below. Direct costs associated with staffing and supplying the TASS Battalions were excluded because these costs are incurred by organizations outside of the CGSC (e.g., the Army Training Support Center) and because reproduction and shipping costs lag approximately one year behind the implementation

Table B-2. Inclusions and Exclusions in the Present Cost per Student Metric

Category	Item	Included	Excluded
Direct Costs	Personnel (salaries, benefits, etc.) to deliver ILE	SADL personnel and staff located at Fort Leavenworth	CGSS faculty (resident and satellite) and admin staff (requested data not made available); Faculty and admin staff located at the TASS Battalions
	Supplies	CGSS (resident and satellite) and SADL supplies	Supplies for TASS Battalions
	Other	CGSS printing and reproduction and shipping to satellite locations; DOET contract costs associated directly with the LVN LLI (hardware, software, supplies, personnel, and travel)	SADL printing and reproduction and shipping to TASS Battalions and individuals (incurred by the Army Training Support Center)
Indirect Costs	Institutional Support - CGSC	DOET and QAO direct costs (personnel, supplies, and other costs, allocated by estimated percent personnel time spent on CGSS and ILE)	FSDO direct costs; CGSC executive staff (e.g., commandant) and all other institutional support offices in CGSC (e.g., academic outreach, library, etc.)
	Institutional Support - Fort Leavenworth	None	All (e.g., housing, food service, post security, etc.)
	Facilities	Replacement costs for information technology, classrooms, offices, etc., for CGSS presence in Bell Hall (represented as annual use charges, allocated by assignable square feet of the New Lewis & Clark Building)	Replacement costs for information technology, classrooms, offices, etc., for CGSS presence in Eisenhower Hall, for SADL (located in Eisenhower Hall), for satellite locations, and for TASS Battalions
Opportunity Costs	All (i.e., cost of activities not conducted because resources were allocated to ILE)	None	All

of a new initiative[3]. Direct costs for CGSS personnel were excluded because the requested data were not made available for investigation and in any case would have spuriously increased the LVN LLI cost per student metric due to cost-of-living raises. Selected indirect costs associated with institutional support (within the CGSC and across Fort Leavenworth) were excluded because they were not of primary interest to the project sponsors and required installation-wide coordination efforts that exceeded the scope of this short-term research. Indirect facilities costs associated with the CGSC presence outside of Bell Hall (soon to be moved to the new Lewis & Clark Building)--i.e., Eisenhower Hall, satellite campus facilities, and TASS Battalion facilities--were excluded because replacement cost data were not readily available and required significant coordination beyond the scope of the research. Finally, opportunity costs were not considered because they would be speculative at best.

The overall impact of these exclusions on the cost per student metric is that (a) cost per student for *both* traditional and LVN LLI delivery will be significantly underestimated; and (b) the relative change in cost per student across mode of content delivery will be significantly overestimated. In addition, because cost-of-living escalation could not be accounted for, the change in cost per student is slightly higher than it would be if such escalation was addressed.

The Faculty and Staff Development Office (FSDO) was considered for inclusion as an indirect cost because it supports the educational effectiveness of the LVN LLI through developing and certifying ILE instructors. Changes in the demand for instructors or in the demand for specialized instructor skill sets could have an impact on the staffing requirements and personnel allocation of the FSDO. Similarly, the Quality Assurance Office (QAO) was considered as an indirect cost because the staffing or personnel allocation of the QAO can be affected by changes introduced by the LVN LLI. The QAO provides annual and periodic educational program evaluations for the CGSC, and the introduction of new technology produces a requirement to evaluate that technology, perhaps independently of the course to which the technology has been applied. FSDO costs were excluded from the present cost metric because there has not yet been a change in FSDO staffing requirements due to the LVN LLI. FSDO personnel expenses over the past several years associated solely with cost of living increases would spuriously increase the LVN LLI cost-per-student relative to previous conditions.

The widely recognized challenges to collecting cost per student metric data include (a) differences between the financial reporting methods of the institution and the financial reporting requirements of cost accounting; (b) determining the basis for allocating indirect costs; (c) quantifying opportunity costs; and (d) accounting for all known costs associated with education delivery (e.g., Middaugh, 2000). Consistent with reports of other program evaluations in higher education, all of these challenges were encountered in the present evaluation. The cost per student comparison metric therefore must be considered an estimate serving illustrative purposes rather than a hard number reflecting actual resource expenditure.

[3] Discussion with staff at the Army Training Support Center indicated that approximately $200K in curriculum production and shipping will be saved by placing ILE on the web. The initiation of these savings will not be observed until 2008 and will not be sudden, but placing ILE on the web eventually will result in an annual savings of $200K.

Overall, the abbreviated cost per student for delivering ILE using the LVN LLI relative to the abbreviated cost of delivering the ILE pilot curriculum using traditional means is greater by a factor of 1.2[4]. It cost $163.14 more per student in the first year to deliver ILE using the LVN LLI initiative than using traditional means averaged over two years. This increase is trivial compared to the overall cost of providing ILE, which is significantly underestimated due to the excluded costs described above. Had these costs been included, the relative cost of delivering ILE via the LVN LLI would have been even lower.

Selected Output Metrics – Actual System Usage

Three metrics capturing the actual usage of the LVN LLI were measured in an attempt to understand better the outcome metrics presented above. Several of these outcomes, such as high proportions of student learning self-efficacy, self-leadership, and motivation, cannot be linked definitively to the LVN LLI as a causal factor because the analogous data were not collected prior to its implementation. In other words, there was nothing to compare the present outcome data to, so it is unknown whether it represents a change. Usage data should illuminate the potential impact of the LVN LLI on the outcomes measured because use of the system is necessary to achieve impact. Use data also reveals relative demand on the system, which may have implications for technical support staffing decisions or for identifying the geographic location of most users. The three usage metrics described below were selected in order to explore whether or not the educational technology made available to curriculum developers, instructors, and students was used to enhance the learning experience. A detailed description of each metric is provided below.

1. Pattern of access as a function of time of day. Because ILE course content is stored in Blackboard, and student access to Blackboard can reflect direct interaction with curriculum materials, patterns in student hits to the Blackboard document repository were examined. Specifically, the shape of the frequency distribution of hits as a function of time of day (hour by hour) was analyzed. This analysis was conducted using data collected automatically by Blackboard for resident and satellite ILE students.

Between June 20 and September 21, 2006, Blackboard had received 48,652 hits. The Blackboard data received to conduct further analysis provided only a summary of the frequency data (i.e., total number of hits, a histogram plot of the hits as a function of time of day, and a listing of the number of hits per time of day and their corresponding percentage), so a representative sample of these hits (487, or 1%, preserving the relative frequency of hits as a function of time of day) was used to plot the distribution of hits and test the normality of this distribution, as shown in Figure B-3.

A Kolmogorov-Smirnov test of normality was applied to the sample dataset, and was significant (p = .044), suggesting that the distribution of hits a function of time of day is non-normal. The Kolmogorov-Smirnov test is known to be sensitive to large sample sizes, however, and other data (i.e., skewness = -.019; kurtosis = -.335) indicate that the deviation from normality is slight. Visual inspection of the data reveals that students primarily access the

[4] The exact estimates and calculations used to derive this metric can be obtained by contacting the report author, Dr. Anna T. Cianciolo (acianciolo@cpresearch.net).

Blackboard document repository during normal business hours, with reduced access at other times, but that there is a spike in activity after the dinner hour, between 7 and 10pm.

Together, these findings represent an expected pattern of access given that the students accessing the Blackboard content repository (i.e., students in residence at Fort Leavenworth and at satellite locations) are in adjacent time zones (i.e., Central and Eastern). The spike in access after the dinner hour suggests that students are using the system to conduct educational tasks while at home or otherwise away from the classroom setting. A more horizontal distribution should be expected in a complete sample of user activity that captures reach back from widely distributed locations, such as Hawaii, Korea, Europe, and the Middle East.

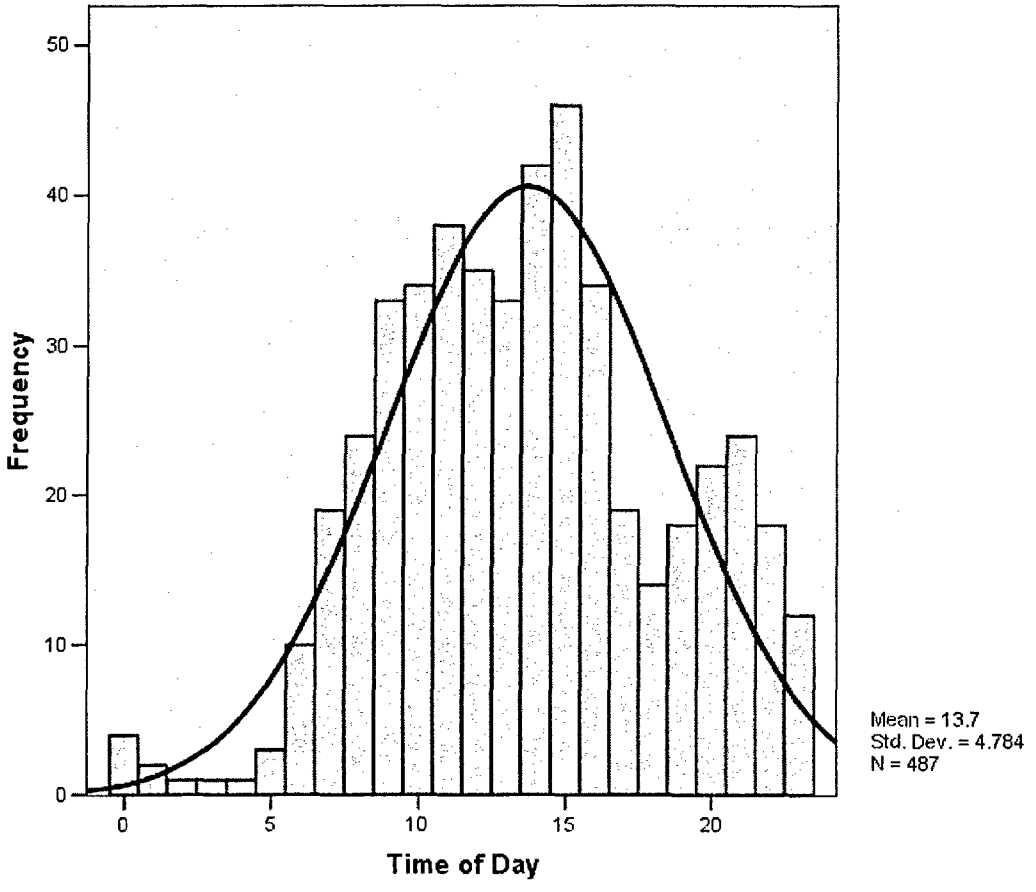

Figure B-3. Pattern of Access to Blackboard Content Repository as a Function of Time of Day

2. Frequency of access to system during normal business hours vs. off-hours. The same data were used to compute this metric as were used to compute the previous metric. Business hours were defined as 7am to 5pm, Central Standard Time, to account for classes beginning at 8am in the Eastern time zone. Approximately 69% of student access occurred between 7am and 5pm, and 31% between 5pm and 7am. Of the off-hours hits, approximately 91% occurred between 6am and 7am and between 5pm and midnight. Again, this pattern is expected given the student population using the system. A greater equivalence between the percentages of on- and off-hours hits would be more likely if the hits of all types of users (i.e., graduates using Blackboard for reachback) were tracked.

3. Percent of registered users who actively used the system. This metric was captured by combining selected survey responses given by curriculum developers, instructors, and students. Specifically, a set of four yoked questions was present in the surveys administered to the three user types (one question each in the curriculum developer and instructor surveys, two questions in the student survey), and the responses to these questions were examined collectively. In their respective survey, each type of user responded to a question in which they were asked the primary means by which they carried out educational tasks. For example, curriculum developers were asked what means they used most often to share course content during the authoring process. Instructors were asked the means they used most often to deliver supplemental course content. Students were asked the primary means by which they accessed course content and coordinated with other students[5].

Respondents indicating that they used a means other than the LVN LLI components "most often" or "primarily" to conduct educational activities were not considered active users of the system. In sum, forty percent of course authors (4 of 10) used SharePoint to collaborate on curriculum development, 30% of instructors (21 of 69) used Blackboard to distribute course materials, 37% students (92 of 251) accessed Blackboard to retrieve course materials, and 5% of students (13 of 251) used SharePoint to coordinate with one another on group projects or other activities. For instructors ($N = 69$), a greater proportion actively used Blackboard to teach August-start than to teach February-start ILE (34% and 24%, respectively). In contrast, a smaller proportion of August-start students reported actively using Blackboard than February-start students (28% and 55%, respectively). The reason for the inconsistent pattern of these differences is unknown. The relatively small proportion of students using SharePoint to coordinate with one another likely is due to the fact that (a) the students surveyed were co-located and preferred face-to-face means of collaboration (38%); and (b) login requirements made using SharePoint from home more difficult to use than email (50% reported using email, and survey responses indicated that login requirements were a detractor).

Summary. System (i.e., Blackboard knowledge repository) access data indicate that the LVN LLI is available and used around the clock, with access patterns reflecting those expected if users are students primarily located within the same or adjacent time zones and if these student users access the system from home to conduct their studies. Peak access activity occurred during business hours and in the early morning and immediate post-dinner hours.

In the schoolhouse, the LVN LLI components (i.e., Blackboard and SharePoint) appear to be competing with other alternatives, and even with each other, for usage. That is, only 30% of surveyed instructors reported using Blackboard as their primary means for distributing course content, with SharePoint being the most frequently reported alternative (39% of instructors). Students surveyed reasonably reported a similar pattern of use; 37% reported using Blackboard most often to access course content, citing SharePoint most frequently as the alternative (33%). Only 5% of surveyed students reported using SharePoint to collaborate with other students, with email and face-to-face meetings most frequently cited as alternatives (50% and 38%, respectively). Comments on student and instructor surveys indicated that there was some

[5] It was assumed that 100% of students used Blackboard to access main, or standardized, curriculum content because it was not available using other means.

confusion as to why there were two systems which have so many overlapping features. When forced to make a choice, people appear to use the most readily available or familiar means to conduct their academic tasks.

Selected Activity Metrics – Technical Staff

Four metrics capturing the activity of technical staff were measured. These metrics were selected in order to explore the degree to which technical staff activity could be expected to support curriculum developer and instructor use of the software comprising the LVN LLI (see DTIC, 2000; Willis, 2000). According to the logic model developed as part of this research, effective use of the software is a critical determinant of the learning effectiveness of the system. A detailed description of each metric is provided below.

1. Percent of instructors and curriculum developers trained to technical criterion. The original plan for capturing this metric was to (a) audit Blackboard and SharePoint instruction; (b) develop a knowledge or performance measure to capture student achievement of the learning objectives; and (c) determine the percentage of students performing successfully on the special purpose measure. After auditing the Blackboard and SharePoint instruction, however, it was determined that a knowledge or performance measure would not be necessary to capture student achievement and that all students achieve the technical learning objectives upon completion of the instruction.

On-site contractors in the CGSC DOET provide basic Blackboard and SharePoint instruction on every working Friday and more advanced instruction on an as-needed basis for individuals or groups with special requests. DOET began delivering Blackboard and SharePoint instruction in July of 2006, prior to which the instruction was conducted by the CGSC FSDO. DOET assumed responsibility for conducting the training so that technical instruction could be delivered by staff dedicated to understanding and maintaining currency with the technology. Participants in the instruction include curriculum developers (i.e., block and lesson authors), instructors, and ILE students (including international students) who have voluntarily sought it out. Basic SharePoint instruction is required for ILE students who are appointed to serve as the information management officers for their staff groups. Learner groups in the Blackboard and SharePoint instruction are usually small, averaging approximately four students, and most of the instruction is conducted on a one-on-one basis.

Both Blackboard and SharePoint basic instruction are accomplished via a combination of PowerPoint presentation and practical exercises. Class time usually lasts approximately one-hour. The Blackboard instruction has three technical learning objectives: (1) Add an announcement; (2) Add course content; and (3) Add users to a staff group. The SharePoint instruction has five technical learning objectives: (1) Create a library (document or picture); (2) Add a survey; (3) Add a custom list; (4) Create a view; and (5) Set permissions. Students do not leave the class until they have accomplished these learning objectives.

Two survey questions were developed to address participation in and retention of the Blackboard and SharePoint instruction. Both curriculum developers and instructors were asked whether they had participated in Blackboard or Sharepoint instruction and whether they had to

relearn anything they had been taught during the instruction in order to perform their duties. Of 9 course authors and 67 instructors who indicated that they had taken Blackboard or SharePoint instruction, 53% (37 of 67 instructors; 3 of 9 course authors) reported having to relearn the instructional content.

It is unknown which of these respondents participated in instruction provided by the DOET versus the FSDO. Because all but one of the 10 course authors surveyed had authored for both February- and August-start ILE, it is unlikely that they participated in DOET SharePoint instruction. However, among the instructors, 76% ($N = 13$) of those who taught only the February-start reported relearning Blackboard instruction whereas only 44% ($N = 17$) of the August-start reported relearning. This trend suggests that instruction provided by the DOET, which began in July of 2006, may be producing greater retention.

2. Percent of instructors and curriculum developers trained to criterion on content management/delivery procedures. Interviews with the DOET technical support as well as curriculum developers and instructors indicated that formal information-management procedures for Blackboard or SharePoint do not exist. Instead, some control measures were built into the design of the software applications by the DOET technical staff. Beyond these control measures, curriculum developers and instructors were given the authority to create informal information-management procedures in collaboration with their working groups (and with the DOET technical staff, if desired). For these reasons, instructors and curriculum developers do not receive training on content management/delivery procedures.

3. Accessibility, usability, and utility of help documentation for instructor and curriculum developer self-development. The accessibility, usability (i.e., readability), and utility of help documentation was assessed using three separate survey questions in which curriculum developers and instructors reported their perceptions. Instructors reported on the accessibility, usability, and utility of Blackboard help documentation, which includes an electronic version of the Blackboard user manual and additional online help for basic functions developed in-house by the DOET. Curriculum developers reported on the accessibility, usability, and utility of SharePoint help documentation, which includes an electronic version of the SharePoint user manual.

Of the 69 instructors who responded to the survey, 66 reported on the accessibility and usefulness of the Blackboard help documentation, and 68 reported on its readability. A substantial proportion of respondents for each question indicated that they had never looked for or used the help documentation (44%, 51%, and 57%, respectively). Of those who looked for help documentation, 58% (21 of 36) reported that they could usually or always find the topics they were looking for. Thirty-nine percent of respondents (12 of 31) who used the Blackboard documentation found that it either partially or completely met their information needs, and 41% of respondents (12 of 29) reported that the Blackboard documentation was understandable.

Of the 10 curriculum developers who responded to the survey, 10 reported on the accessibility of the SharePoint help documentation, 9 on its usefulness, and 8 on its readability. Most course authors reported either having not looked or not used the documentation. The single course author who reported looking for documentation reported usually being able to find it. Of

the 3 course authors who reported using the SharePoint help documentation, none of them found it useful. The one person who reported on the readability of the help documentation (7 of 8 reported not using it) indicated that they generally had no trouble with readability. It is unknown why more course authors reported having used the help documentation than having looked for it. It also is unknown why the number of authors reporting on the utility of the help documentation was higher than the number reporting having used it.

4. Perceived accessibility/responsiveness and utility of technical support. Students, instructors, and course authors were surveyed regarding their perceptions of the accessibility and the utility of the technical support provided by the DOET. The responses of these different users are summarized in Table B-3 below.

Table B-3. Perceived Accessibility and Utility of Technical Support – Survey Responses

User Type	% Looked for TS	% Accessible	% Used TS	% Good Experience
Course Author	80% (8 of 10)	88% (7 of 8)	80% (8 of 10)	88% (7 of 8)
Instructor	71% (49 of 69)	69% (34 of 49)	64% (44 of 69)	73% (32 of 44)
Student	71% (178 of 250)	58% (104 of 178)	63% (156 of 247)	63% (98 of 156)
Average	71% (235 of 329)	62% (145 of 235)	64% (208 of 326)	66% (137 of 208)

Note, TS = Technical Support.

As shown in Table B-3, the majority of course authors, instructors, and students sought and used the technical support provided by the DOET. Importantly, the majority of people found the technical support they were looking for. The proportion of satisfied users was larger for August-start students and instructors than for February-start students and instructors (81% good experience versus 67% good experience for instructors, and 67% good experience versus 54% good experience for students.) All but one of the course authors had written content for both February- and August-start ILE.

Summary. The technical staff appears to provide adequate, effective support to LVN LLI users. It provides basic training on the functions of the LVN LLI components in which the large majority of instructors and course authors surveyed (>90%) took part. A minority of course authors (33%) and August-start instructors surveyed (44%) reported that they had to relearn some of the instructional material, but it is unclear how many of these people went through the training provided by the DOET versus the FSDO. Although formal, institutional SOPs for information management in the LVN LLI do not exist, the DOET technical staff assists teaching teams and curriculum development teams in creating their own procedures. Overall, students, instructors, and curriculum developers reported having a good experience with finding and using technical support (62% and 66%, respectively). The reported frequency of good experiences was higher for August-start survey participants (70%) than for February-start participants (56%). In contrast, the Blackboard and SharePoint help documentation appeared to be of limited utility. The small majority of instructors (58%) could find Blackboard help documentation, but only 39% found it useful or readable (41%). The large majority of course authors surveyed did not look for or use SharePoint help documentation.

Selected Activity Metrics – Curriculum Developers

Ten metrics capturing the activity of curriculum developers (i.e., block authors and lesson authors) were measured. These metrics were selected in order to explore the degree to which curriculum developers were actually using SharePoint to collaborate. These metrics also were designed to capture how frequently course authors were leveraging resources made available in the LVN LLI to enhance course content. According to the logic model, effective use of SharePoint and other LVN LLI resources by curriculum developers is an important determinant of the efficiency and relevance of ILE course content. A detailed description of each metric is provided below.

1. Perceived ease of using SharePoint to share documents and other materials used in generating course content. A single survey question was used to assess curriculum developers' perceptions of the ease of using SharePoint. Of the 9 course authors who responded to this survey question, 8 (89%) indicated that it was easy or fairly easy to post and locate curriculum content in SharePoint.

2. Percent of curriculum developers who reported being able to use SharePoint outside of the schoolhouse setting. A single survey question was used to assess curriculum developers' experiences accessing and using SharePoint from home or some other location other than their office at Fort Leavenworth. Of the 7 course authors who responded to this survey question, 5 (71%) reported having no real problems.

3. Percent of curriculum developers using SharePoint to store, share, and revise course content materials. Curriculum developers' use of SharePoint to store, share, and revise curriculum materials was captured using a survey question in which respondents selected the primary means by which they distributed course content to other developers. Respondents selecting an option other than SharePoint were not considered to be using SharePoint to store, share, and revise because they were actively involved in using some other means. Of the 10 curriculum developers who responded to the survey, 4 (40%) reported using SharePoint as the primary means for distributing course content materials to others.

4. Percent of curriculum developers who reported using means to collaborate other than/in addition to SharePoint (e.g., email, thumb drives, etc.). The percentage of curriculum developers using means in addition to/other than SharePoint to collaborate was assessed with the same survey question described above. Of the 10 curriculum developers who responded to the survey question, 6 of 10 (60%) reported using something other than SharePoint as the primary means for distributing course content materials to others. The most frequently cited alternatives were the internal network (2 of 10) and email (3 of 10).

5. Percent of curriculum developers using Battle Command Knowledge System (BCKS) Leader Network to enhance course content. Curriculum developers were asked in a single survey question how important the discussion forums in the BCKS Leader Network were for them when conducting searches to enhance course content. Respondents answering that the Leader Network was equally or more important relative to other resources were assumed to be using actively the Leader Network. Of the 7 course authors who reported searching for current information, all of them reported actively using the Leader Network for conducting knowledge searches.

6. Percent of curriculum developers using other Army Knowledge Management (KM) resources to enhance course content. In the same survey question described above, curriculum developers were asked how important other Army KM resources, such as Army Knowledge Online or the Center for Army Lessons Learned, were for them when conducting knowledge searches. Respondents answering that Army KM resources other than BCKS were equally or more important relative to other resources were considered to be using actively Army KM resources. Of the 9 course authors who reported searching for current information, 7 (78%) reported actively using Army KM resources for conducting knowledge searches.

7. Percent of curriculum developers using non-Army resources to enhance course content. The same survey question to assess the above two metrics was used to assess this metric. Curriculum developers were asked to indicate how important non-Army resources, such as Google or Early Bird, were for them when conducting knowledge searches to enhance their course content. Of the 10 course authors who reported searching for current information, 2 (20%) reported actively using Army KM resources for conducting knowledge searches.

8. Presence of formal and/or informal standard operating procedures (SOPs) for leveraging the capabilities of the software applications, including content organization (Yes/No). The presence of formal and/or informal standard operating procedures was assessed by interviewing the technical support staff and surveying and interviewing curriculum developers. The interviews indicated that SOPs did not exist formally outside of the structure of the SharePoint site for curriculum developers. Informal SOP development sometimes was accomplished when working groups of course authors requested assistance from the technical staff in leveraging SharePoint's advanced capabilities. When surveyed about their participation in SOP development, 7 of 9 course authors responded that there were no SOPs.

9. Percent of early adopters involved in SOP development. Curriculum developers were surveyed to assess how many were involved in SOP development. Early adopters were not distinguished from late adopters in the present research because all curriculum developers using SharePoint in the pilot phase and assisting in SOP development were considered early adopters. Of the 9 curriculum developers who reported on SOP development, 2 reported that they had been involved in such development but that the SOPs they worked on did not cover everything and were not always followed.

10. Presence of a formal and/or informal mentorship system for assisting late adopters leverage software capabilities (Yes/No). The presence of a formal and/or informal mentorship system was assessed by interviewing the technical support staff and surveying curriculum developers. Both sources of information indicated that there was not a formal mentorship program. Informal mentorship in the form of advanced SharePoint and Blackboard classes, was provided by the DOET technical support staff on an as-needed basis. Individual developers or working groups of developers could request advanced training to meet their specific requirements. Course authors who reported on mentoring via survey indicated that help with SharePoint by peers was largely informal (4 of 10 respondents reported asking others for help) but that occasionally more formal mentoring occurred (3 of 10 respondents reported having group discussions or regularly helping others).

Summary. Although the response rate for course author surveys was 67%, it must be noted that only 15 course authors were invited to participate in the survey, so several of the curriculum developer metrics are based on the reports of only 10 people. That said, the active adoption rate of SharePoint was 40% among course authors. Course authors do not appear to have had much difficulty using or accessing SharePoint. Eighty-nine percent felt SharePoint was easy or fairly easy to use and 71% reported no significant problems accessing SharePoint from home. Instead, adoption rates lower than criterion (i.e., 100%) appear to be linked to the ready availability of flexible alternatives for sharing documents, such as the college internal network and email.

Course authors occasionally helped one another to use SharePoint, but there does not appear to be a consistent formal codification of what was learned. Most course authors stated that there were no SOPs for posting content in SharePoint, although 2 of 9 claimed to have been involved in the development of SOPs. The most common mode of seeking help was to ask a peer, rather than to develop a collective knowledge base.

Army KM resources appear to have been most important to curriculum developers when authoring course content. The large majority of course authors stated that BCKS Leader Network (7 of 7) and other Army KM resources (7 of 9) were equally or more important than non-Army resources, such as Google and Early Bird. This finding suggests that curriculum developers are making use of the available connection to the operational Army, despite the fact that they cannot accelerate the curriculum production process in order to respond adaptively to what they find.

Selected Activity Metrics – Instructors

Eleven metrics capturing the activity of instructors were measured. These metrics were selected in order to explore the degree to which instructors were actually using Blackboard to distribute course-related materials. These metrics also were designed to capture how frequently instructors were leveraging resources made available in the LVN LLI to supplement the formal curriculum. According to the logic model, effective use of Blackboard and other LVN LLI resources by instructors is an important determinant of the relevance of ILE course content (Clark, 1994; Ehrmann, 1994; Owston, 1997). A detailed description of each metric is provided below.

1. Percent of instructors who used means other than Blackboard to deliver course content. This metric was assessed with a single survey question in which instructors were asked to report the means they used most often to post course content. Instructors were directed to post all course content to students via Blackboard, so a selection other than Blackboard in response to this question was intended both to reflect system adoption and to identify the preferred alternatives to system use. Of the 69 instructors who responded to this survey question, 70% reported using something other than Blackboard most often when posting course content. The most frequently sited alternative means for posting content was SharePoint (39%, 27 of 69). Other alternatives sited included printed materials (17%), email (9%), and the internal network (4%).

Of the 17 respondents who taught only February-start ILE, 76% (13 of 17) reported using means other than Blackboard to post content most often, whereas 66% (27 of 41) of the 2006 August-start respondents reported the same. This trend suggests increasing adoption of Blackboard, but that adoption levels remain somewhat low. For both sets of respondents, SharePoint was the most frequently cited alternative to posting in Blackboard (53% and 37%, respectively).

2. Percent of instructors who used BCKS Leader Network to post supplemental course content in Blackboard. Instructors were asked in a single survey question how frequently they accessed discussion forums in the BCKS Leader Network to conduct information searches to enhance course content. Respondents answering that they accessed the Leader Network daily or weekly were considered to be using actively the Leader Network. Of the 65 instructors who responded to this question, 12% ($N = 8$) responded that they did not search for supplemental information. Of the remaining 57 respondents, 4% ($N = 2$) reported actively (weekly only) using the Leader Network for conducting knowledge searches. Seventy percent reported never using it.

3. Percent of instructors who used other Army KM resources to post supplemental course content into Blackboard. Similar to the survey question above, instructors were asked how frequently they used other Army KM resources to conduct knowledge searches. Respondents answering that they used Army KM resources other than BCKS daily or weekly were considered to be using actively Army KM resources. Of the 67 instructors who responded to this question 9% ($N = 6$) indicated that they did not search for supplemental information. Twenty-six percent of the remaining respondents (16 of 61) reported actively (daily and weekly) using Army KM resources for conducting knowledge searches. Twenty-eight (17 of 61) percent reported never using Army KM resources.

4. Percent of instructors who used non-Army resources to post supplemental course content into Blackboard. The same survey question to assess the above two metrics was used to assess this metric. Instructors were asked to indicate how important non-Army resources, such as Google or Early Bird, were for them when conducting knowledge searches to enhance their course content. Of the 69 instructors who responded to this question, 7% (5 of 69) indicated that they did not search for supplemental information. Seventy-eight percent (50 of 64) reported actively (daily and weekly) using non-Army resources for conducting knowledge searches.

5. Perceived ease of updating course content within the LVN LLI framework. Instructors were surveyed to determine their perceptions of how easy it was to use Blackboard to distribute supplements to the formal ILE curriculum. Of the 60 instructors who reported having posted in Blackboard, 58% ($N = 35$) indicated that that it was fairly easy or easy to post content and 42% reported some or great difficulty. Sixty-four percent of the February-start instructors who posted in Blackboard (9 of 14) reported that it was easy or fairly easy and 64% of the August-start instructors (23 of 36) reported the same. Thirty-six percent of both samples reported some or great difficulty.

6. Percent of instructors who used Blackboard to provide "read ahead" notes for each class. In a single survey question, instructors were asked to identify which of several administrative tasks they used Blackboard to conduct. The list of administrative tasks included

(a) making announcements; (b) delivering handouts; (c) coordinating class activity or group projects; (d) administering multiple-choice exams; (e) receiving course products (e.g., term papers, presentations, etc.); (f) recording grades; and (g) none of the above. Of the 69 instructors who responded to the survey, 52% ($N = 36$) reported using Blackboard to provide "read ahead" notes (i.e., to deliver handouts) for each class. Forty-nine percent ($N = 34$) used Blackboard to make announcements, 26% ($N = 18$) used it to coordinate class activity or group projects, and 12% ($N = 8$) used it to receive course assignments. Approximately one-third of the sample ($N = 23$) reported not using Blackboard for any administrative tasks.

7. Percent of instructors who used Blackboard to administer course exams. As indicated in instructor responses to the question described above, 10% ($N = 7$) used Blackboard to administer course exams. One likely reason for this low percentage is that many of the methods used to assess student performance in ILE do not involve multiple-choice exams.

8. Percent of instructors using Blackboard to report student grades to administrators. Ten percent of instructors (7 of 69) reported using Blackboard to report grades. Currently, Blackboard is not the official means by which grades are delivered to the college administration. Rather, a different means--the legacy data entry and storage system used by the administration, which is not interoperable with Blackboard--is used. It is likely for this reason that instructors reported a low adoption rate for the Blackboard grade book. The instructors interviewed did not see a benefit to recording the same grades twice.

9. Presence of formal and/or informal SOPs for leveraging the capabilities of the software applications for course administration and facilitation (Yes/No). The presence of formal and/or informal standard operating procedures was assessed by interviewing the technical support staff and surveying and interviewing instructors. The interviews indicated that SOPs did not exist formally outside of the structure of the Blackboard site for instructors. Informal SOP development sometimes was accomplished when teaching teams requested assistance from the technical staff in leveraging Blackboard's advanced capabilities. When surveyed about participating in the SOP development process, 52% (34 of 66) of instructors stated that there were no SOPs.

10. Percent of early adopters involved in SOP development. Instructors were surveyed to assess how many were involved in SOP development. Early adopters were not distinguished from late adopters in the present research because all instructors voluntarily and actively using Blackboard in the LLC pilot and assisting in SOP development were considered early adopters. Of the 66 instructors who responded to this question, 33% ($N = 22$) reported being involved in the development process.

11. Presence of a formal and/or informal mentorship system for assisting late adopters leverage software capabilities (Yes/No). The presence of a formal and/or informal mentorship system for instructors was assessed by interviewing the technical support staff and surveying instructors. Both sources of information indicated that there was no formal mentorship program. As described previously, informal mentorship in the form of advanced Blackboard classes, was provided by the DOET technical support staff on an as-needed basis. Individual instructors or teaching teams could request advanced training to meet their specific requirements. Forty percent

($N = 27$) of the 69 instructors who responded to the survey indicated that they were occasionally or regularly involved in some kind of informal group activity (e.g., discussion groups) whose intent was to share knowledge about leveraging Blackboard's capabilities.

Summary. Overall, the instructor activity metrics revealed that instructors have been slow to adopt Blackboard both for posting course content and for conducting administrative tasks. Although adoption rates improved from 24% (February-start) to 34% (August-start), a greater level of adoption will be necessary to optimize the impact Blackboard could have on teaching and learning. The metric results do not suggest that technical difficulty is the main barrier to Blackboard use, but rather that instructors have several alternatives readily available (and perhaps more familiar) to them for conducting academic tasks. For instance, instructors most frequently reported using SharePoint as their primary alternative to Blackboard for posting supplemental course content (39%).

There appeared to be interest among instructors to help one another in using Blackboard, but formal codification of what was learned seemed to exist in pockets. For example, about as many instructors stated that there were no standard operating procedures for posting content in Blackboard as there were instructors reporting that they had participated in the development of just such procedures. Moreover, the most common mode of seeking help was to ask a peer, rather than to develop a collective knowledge base.

Of the knowledge resources instructors rely on to supplement curriculum materials, non-Army resources, such as Google and Early Bird, by far have the greatest frequency of access (78% weekly or daily access), relative to Army KM resources (26% weekly or daily access) and the BCKS Leader Network in specific (4% weekly or daily access). This finding suggests a disconnect between the operational Army and the institutional Army that should be addressed before the full impact of the LVN LLI on course relevance can be achieved. However, the ability to repair this disconnect is beyond the scope of the LVN LLI architects, and the majority of stakeholders feel that course content is already relevant.

Selected Activity Metrics – Leadership

Six metrics capturing the activity of the LVN LLI leadership were measured. These metrics were selected in order to explore the efficacy of the leadership in overseeing the initiative, procuring resources, and generating vision in collaboration with stakeholders (see, e.g., DTIC, 2000; Willis, 2000). According to the logic model, effective leadership is an important determinant of stakeholder adoption of instructional technology, which is critical for achieving educational impact. A detailed description of each metric is provided below.

1. Stakeholder perceptions of inclusion in the decision-making process. This metric was captured by surveying curriculum developers and instructors, asking them if they had participated in the decision making that led to the adoption of SharePoint and Blackboard as a replacement for the system they were used to using. Seven out of 10 (70%) of the curriculum developers indicated that they did not provide input to the decision making process. None of the three course authors who did report providing input were sure if their input had been used. Of the 67 instructors who reported on their involvement in the decision making, 82% (55 of 67) percent

indicated that they did not provide input and none of those who reported providing input were sure whether their input had been used.

2. Percent of curriculum developers who understood the "commander's intent" for the LLC. A single survey question addressed this metric. Curriculum developers were asked to indicate their understanding of the LLC concept and were given a series of options from which to select the statement that best reflected their understanding. Seven of the 10 course authors who responded to this survey question selected a definition that captured at least some aspect of the intent of the LLC concept. Three of 10 selected a definition that closely resembled statements in the LLC planning documentation.

3. Percent of instructors who understood the "commander's intent" for the LLC. In a separate survey, instructors were asked the same question as the curriculum developers. Sixty-two percent ($N = 42$) of the 67 instructors who responded to this survey question selected a definition that captured at least some aspect of the intent of the LLC concept. Forty-eight percent ($N = 33$) selected a definition that closely resembled statements made in the LLC planning documentation.

4. Adequacy of funding for the LLI. This metric was captured by an interview with the DOET leadership in which the leadership was asked about the adequacy of LLI funding and the challenge areas in procuring funding for the LLI. The DOET leadership indicated that there was no difficulty securing funding to meet the costs of the LLI and that the current funding levels were adequate for meeting LLI needs.

5. Adequacy of personnel for the LVN LLI. This metric was captured partially by an interview with the DOET leadership in which the leadership was asked about the adequacy of personnel for supporting the LVN LLI and, if inadequate, what additional personnel must be hired to effectively support the LVN LLI. The DOET leadership indicated that current technical staff levels were sufficient for meeting LVN LLI needs. It also was communicated, however, that down time in the availability of the LVN LLI to students, faculty, and curriculum developers was a result of preventable mistakes by technical personnel. For example, a week-long outage of Blackboard was attributed to the failure of the technical staff to follow common procedures for backing up database contents. A 45-minute outage of SharePoint was attributed to the failure of the network administrator to maintain the appropriate access permissions to the Fort Leavenworth domain.

The DOET leadership emphasized that although the Web presence of the LVN LLI has achieved very high levels of stability, even minor downtime can have a substantial impact on user trust in the LVN LLI's ability to meet instructional needs and consequent use of the system. Activities reported as necessary to foster user trust after system downtime included explaining the cause of the downtime and the estimated time to solve system problems. Methods for sharing this explanation included telephone, email, and face-to-face meetings.

Technical staff asked about the adequacy of the personnel supporting the LVN LLI indicated that there were fewer personnel available than required for the start-up phase of the initiative (8 personnel at the time of this reserarch--as opposed to 10--with 3 of the eight

personnel hired on in the summer of 2006). Competing demands on limited staff time may account for the occasional errors leading to system down time. However, the technical staff indicated that the current number of personnel would be sufficient to run the LVN LLI when it has achieved a steady state and that staffing decisions must balance present and future needs.

6. Adequacy of technology for the LVN LLI. This metric was captured by an interview with the DOET leadership in which the leadership was asked about the adequacy of technology for supporting the LVN LLI and, if inadequate, what additional technology must be procured to effectively support the LVN LLI. The DOET leadership indicated that the technology currently available to the DOET was adequate for meeting LVN LLI needs.

Summary. The LVN LLI leadership has successfully procured resources to ensure the adequate functioning of the technical aspects of the initiative. This emphasis on technological functioning is consistent with the mission of the DOET, which was assigned to lead the implementation of the initiative. There appear to be, however, some less technical leadership tasks, arguably outside of the scope of the DOET, that have not been addressed and likely have implications for system adoption. These interpersonal leadership tasks include communicating the educational vision of the LVN LLI and winning the stakeholder buy-in. A large majority (81%; 62 of 77) of instructors and course authors reported that they did not provide input to the decision-making process that has created new work demands for them. In addition, there is evidence that nearly half (53%, 41 of 77) of the surveyed stakeholders' (i.e., course authors and instructors) were unaware of the intent of TRADOC's lifelong learning initiative.

Conclusions and Recommendations

Results Summary

Overall, the evaluation results indicate that the LVN LLI is a cost-effective solution for enhancing the educational outreach of ILE curriculum materials. For what amounts practically to the same amount of money, ILE delivered via the LVN LLI will eliminate the one-year lag in curriculum content between the schoolhouse and Army reserve facilities and already supports anytime, anywhere learning for ILE students in residence and at satellite campuses. There is relatively little the LVN LLI can do to reduce the 6-10 month lag between changes in the operational environment and revisions to the standardized ILE curriculum, but it is assisting in circumventing this problem by making it easier for instructors to supplement curriculum materials. The majority of students, instructors, and course authors surveyed reported that course content was relevant to the jobs of ILE graduates.

The active adoption rate of the LVN LLI by course authors, instructors, and students in the schoolhouse remains well below 100%. Survey and interview data indicated that technical difficulty was not the main barrier to system use. Rather, the main barriers to system use appear to have been (a) ready availability of alternatives to the system that were more familiar and easier to access; (b) inconsistent or absent information management procedures necessary to make posted content easy to find; and (c) lack of instructor and course author involvement with and buy-in to the lifelong learning concept. As has been found in previous evaluations of this

kind (Cianciolo et al., 2006), greater success has been achieved in the technical implementation of the initiative than in the cultivation of stakeholder enthusiasm and investment.

Limited adoption of the LVN LLI did not appear to hamper the academic experience of ILE students and instructors in the first-year pilot. Large proportions of students reported effective classroom facilitation behaviors by instructors, high levels of learning self-efficacy and motivation, and active involvement in their own learning through independent study. The majority of instructors indicated that the LVN LLI did not negatively impact classroom efficiency, and a small proportion of instructors reported that the LVN LLI enhanced their classroom efficiency.

Recommendations

It would be feasible to recommend that no changes be made to the LVN LLI implementation. If nothing about the LVN LLI implementation were to change from this point forward, ILE instruction would continue successfully, and students--especially those at Army reserve facilities--would benefit from greater access to more relevant standardized curriculum, all at relatively little cost to the Army. Moreover, adoption rates likely would increase on their own [albeit slowly and probably not to criterion (i.e., 100%)], as indicated by the generally upward trend in adoption rates occurring during the first-year pilot.

That said, the findings of the present evaluation illustrate the importance of taking a logic modeling approach to understanding the impact of lifelong learning initiatives. Assessment of the LVN LLI's outcomes alone would have indicated that the initiative had achieved its goals but would have obscured the fact that a subset of these goals--teaching and learning effectiveness--was achieved independently of the use of the LVN LLI's components. Put another way, the LVN LLI has yet to have an impact on enhancing the ILE teaching and learning environment because the unique capabilities of blended learning are not yet being leveraged. Comments made by surveyed students who had used Blackboard as part of their civilian education support this point with observations that civilian educators were more effective at leveraging Blackboard's capabilities to create a true blended learning environment. In addition, survey responses indicate that neither a majority of students (42%, 104 of 250) nor of instructors (26%, 16 of 61) was yet convinced that Blackboard would enhance ILE education. A typical "no significant difference" between traditional and technology-assisted learning may be found in this case (see Russell, 1999), but this finding indicates that the blended learning initiative is not living up to its capability to transform the classroom and engender a cultural shift toward a lifelong learning orientation.

In order for the already successful LVN LLI to achieve optimal educational and organizational impact, stronger beliefs in its purpose and higher active adoption rates of its components must be achieved. The accomplishment of this goal requires fostering the instructor and course author buy-in necessary to learn and adopt unfamiliar technologies and to role-model their use for students. Improved buy-in may be developed through (a) engaging other schoolhouse components in viewing and cultivating LVN LLI-assisted teaching as a critical instructor competency; (b) encouraging and shepherding the involvement of instructors and course authors in the development of information management procedures; and (c) spreading

strategic communications that explain the purpose and goals of the system, that anticipate technical limitations of the system (i.e., login requirements), and that immediately follow system outages.

Other Schoolhouse Components. As described previously, the CGSC DOET is responsible for the implementation, maintenance, and oversight of the LVN LLI. However, a visual inspection of the CGSC organizational chart reveals that other components of the schoolhouse must be involved if a culture of acceptance and engagement in blended learning is to be infused throughout the college. Chief among these components is the Faculty & Staff Development Office, which could assist in developing instructors' ability to visualize and transform the learning experience using Blackboard, even involving Blackboard in the faculty development process itself. Similar assistance could be provided to course authors using SharePoint. Importantly, successfully delivering blended learning must not be viewed as a matter of technology alone, but of effectively integrating educational need, instructional strategy, and advanced technologies (Clark, 1994; DTIC, 2000; Firdyiwek, 1999; Willis, 2000).

Information Management. The vast majority of recommendations from surveyed students was that the schoolhouse choose either Blackboard or SharePoint for posting content and eliminate entirely the system not selected. In both interviews and survey comments, students mentioned being confused by instructors' inconsistent use of two systems with overlapping capabilities and were unable to find content as a result. This confusion appears to have stemmed from ineffective or absent information management procedures on the part of faculty who instead of using the required system (Blackboard) as the primary means for posting content used a more familiar alternative (SharePoint). Faculty and course authors who communicated reluctance to use either system via interview listed inadequate information management as a limiting factor.

The DOET technical staff supports the development of instructor and course author facility with the LVN LLI technologies, even assisting in the development of information management strategies within teaching and authoring teams and modifying the LVN LLI interface to address known information management challenges. However, the technical staff is not responsible for developing school-wide information management procedures, and this responsibility does not appear to be held elsewhere. Instructors and course authors informally help each other, but there is no widely-recognized standard for collaboration. A formal assessment of the information-sharing strategies currently used by faculty and course authors should be conducted to understand user needs and to reveal best practices that can be broadly applied. Instructors, curriculum developers, and even students should be actively involved in the process of articulating need and should participate in system interface design revisions. Ideally, leadership of this needs assessment and design process would be executed by an integrated team of technologists, faculty and staff developers, department chairs, instructor and course author team leaders, and student representatives (e.g., staff group information officers).

Strategic Communications. Strategic communications follow system outages, but do not appear to occur as anticipatory events that could shape perceptions and advance organizational goals. For example, the *CGSC Circular 350-1*, which describes the CGSC, its components, and ILE, does not mention the LVN LLI or TRADOC's lifelong learning initiative in general. A

paragraph or two in the circular explaining the technologies and their intended use would help resident students to understand what the expected benefit is of the system, to view themselves as part of a larger ILE student body that benefits from outreach, and perhaps to see that the LVN LLI implementation has been made in the best interests of leader education. Currently, a minority of students see the initiative as motivated by the desire to improve education, but a shift in this perspective is necessary to empower the initiative to enhance organizational commitment and individual readiness.

Strategic communications that anticipate technical limitations also may be helpful in fostering user support and understanding when difficulties occur. Such communications may include advertising Blackboard and SharePoint instruction for students and explaining the source of multiple login requirements and the reason for two overlapping systems.

Concluding Comments

Ultimately, decisions regarding the future of an initiative are values based (Cukier, 1997). This evaluation report cannot provide values. It is merely intended to support the values-based decision making of others with objective data. The objective data indicate that the LVN LLI is technically well implemented, cost-effective, and enhances educational outreach. The objective data also indicate that some investment is required to strengthen the initiative's impact on teaching and learning. This representation of the LVN LLI places it squarely within the population of technology-assisted learning initiatives working through their first-year pilot and within the population of maturing Army programs designed to support human functioning with technological means. The close coupling of the LVN LLI technologies with the needs and expectations of people who use them will transform the already successful initiative into a potent educational and organizational multiplier.

APPENDIX B-1
CURRICULUM DEVELOPER SURVEY

The curriculum developer survey was administered online for 7 days in collaboration with the CGSC Quality Assurance Office. Curriculum developers who authored course content for either the 2006 February-start ILE class or the 2006 August-start class (or both) received an invitation via email to participate in the survey. Ten curriculum developers responded to the survey, representing a 67% overall response rate. Of these 10 individuals, 0 had authored only the February-start ILE curriculum, 1 had authored only the August-start ILE curriculum, and 9 had authored curriculum materials for both classes. Due to the small number of respondents in each category, the data were collapsed across all course authors for each question. A complete reproduction of the survey is shown below.

SharePoint and Resident ILE - Course Author Experience

The 2006 February-start and 2006 August-start CGSOC classes are serving as test cases for using SharePoint (instead of the g: drive) as the primary means to post and share course curriculum materials during the Course Authoring process. Working within this pilot program, you have probably experienced the inevitable challenges associated with transitioning from one technology to another. Likely, there also have been some unanticipated benefits of the change.

The purpose of this brief, 21-item survey is to capture selected aspects of the Course Author experience using SharePoint to post and share common core curriculum materials. The survey has 3 parts relating to:

1. Technical Support;
2. Curriculum Development; and
3. Participation in the Transition Process.

The goal of this survey is to take the "pulse" of the transition effort -- to identify the strengths and weakness of the technical support provided to Course Authors as well as the actual level of Course Author use of SharePoint. The survey also is intended to reveal the level of participation Course Authors perceive they have had in the process of transitioning from the g: drive to SharePoint.

This survey is completely anonymous and voluntary. Your responses are in no way associated with your name and you may choose, without consequence, not to participate.

As you fill out this survey, consider your experiences in developing curriculum materials for the 2006 February-start or the 2006 August-start ILE CC. Select the response that best describes your experiences associated with each statement. Also, there are optional open ended questions at the end of each section to add comments.

If you have any questions concerning the content of this survey, contact Dr. Anna Cianciolo, 217-621-3918. If you experience technical difficulties with it, contact Mr. Douglas Loa, 913-684-7275.

This Survey has been approved by QAO and the Survey Control number is 06-080

Section I - Technical Support

1. How accessible did you find the technical support to be?

( ) What tech support? I didn't know there was tech support.
( ) I knew how to find the tech support team, but actually getting a hold of someone was unpredictable; on more than one occasion I had to wait longer than I would have liked.
( ) I wouldn't know; I knew there was a tech support team, but I never tried to contact anybody.
( ) I generally didn't have trouble finding or connecting with someone in tech support; if I ever had to wait, it wasn't a big deal.
( ) Finding and connecting with tech support was no problem at all; I always got somebody when I needed them.

2. How useful did you find the technical support to be?

( ) Not at all useful; I had to find other ways to fix my problems."
( ) They solved technical problems ok, but if the tech support was better, the kinds of problems I had wouldn't exist.
( ) I wouldn't know; I never asked for tech support.
( ) I had a pretty good experience; the system worked well enough and when problems did come up, they were usually fixed the first time around.
( ) They're the best; the system worked great and whenever I needed technical assistance, it was provided quickly, effectively, and professionally.

3. How accessible did you find the SharePoint help documentation to be?

( ) What help documentation? I didn't know there was help documentation.
( ) I think there was supposed to be help documentation, but I sure couldn't find it.
( ) I wouldn't know; I never looked for help documentation.
( ) I could usually find help documentation on the topics I needed to know about.
( ) I could always find the topic I was looking for in the help documentation.

4. How useful did you find the SharePoint help documentation to be?

( ) Not at all useful; I don't even bother looking anymore.
( ) It was ok for the topics it handled, but it usually didn't handle the topics I needed help in.
( ) I wouldn't know; I never used the help documentation.
( ) It generally provided useful information, but I don't think it handled everything.
( ) It always met my information needs.

5. How usable (readable) did you find the SharePoint help documentation to be?

( ) The help documentation was mostly gibberish written by someone who knows the system but not how to write.
( ) It was ok; I usually had to read it a couple of times over to get what it was saying, but eventually I understood it.
( ) I wouldn't know; I never used the help documentation.
( ) I usually didn't have trouble understanding the help documentation, but I'm used to reading technical writing.
( ) The help documentation was easy to understand; even my grandmother would get it!

6. Have you participated in SharePoint instruction?

( ) Yes
( ) No - I already know how to use SharePoint
( ) No - I didn't know there was SharePoint instruction
( ) No - I didn't have time

6a. Did you have to re-learn anything you were taught in order to perform instructional tasks?

( ) Yes
( ) No

Additional Comments regarding the Technical Support (optional):

Section II - Curriculum Development

7. How knowledgeable do you feel _____ are with using SharePoint?

your students

( ) Very knowledgeable
( ) Knowledgeable
( ) Somewhat knowledgeable
( ) Very little
( ) Not at all

you

( ) Very knowledgeable
( ) Knowledgeable
( ) Somewhat knowledgeable
( ) Very little
( ) Not at all

8. When you distributed curriculum materials to other Course Authors, what means did you use most often?

( ) SharePoint
( ) g: drive
( ) Distributed via email
( ) Distributed via memory stick/thumb drive
( ) Printed materials
( ) Other (e.g., AKO personal webpage) [ ]

9. How easy was it to post and locate curriculum materials in SharePoint?

( ) It was very difficult; I mostly used other means to share resources with Course Authors.
( ) Let's just say it wasn't the g drive; it limited my options for sharing information with the people who I felt needed it.
( ) No idea; I never posted in SharePoint.
( ) Fairly easy, but the g: drive is more flexible.
( ) Piece of cake; I had no problems at all.

For the following question, consider your experience in past years writing ILE common core curriculum materials.

10. How frequently were you able to update/revise course content based on new developments in the field, instructor or student feedback, etc.?

( ) Regularly; prior to each course administration.
( ) Semi-regularly; prior to most administrations of the course, but not all.
( ) Infrequently; not often enough to do much good.
( ) Never; revisions are so out of synch with course administrations that I don't even try anymore.
( ) N/A; I've only worked on the core curriculum once.

For the following question, consider your experience writing ILE common core curriculum materials since the introduction of SharePoint.

11. How has using SharePoint changed the frequency with which you update/revise course materials?

( ) Frequency greatly decreased; Time that was spent modifying course content is now spent trying to find and/or store files on SharePoint.
( ) Frequency somewhat decreased; SharePoint makes it harder for Course Authors to share the resources that would enhance or synchronize course content.
( ) Not at all; Delays in revising course content have nothing to do with technology - they are administrative in nature.
( ) Frequency somewhat increased; SharePoint makes it easier for Course Authors to share the resources that would enhance or synchronize course content.

( ) Frequency greatly increased; One-stop access to professional forums, Army knowledge repositories, and other Course Authors has revolutionized the way we do business.
( ) N/A; I've only worked on the core curriculum once.

Additional Comments regarding Curriculum Development.(optional):

12. The SharePoint Learning System enhances your students ILE education.

( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

13. How easy was it to access SharePoint from outside the schoolhouse?

( ) I tried to work from home (or away), but never could get access.
( ) I could occasionally get access to SharePoint, but not often enough to make working from outside the schoolhouse a viable option.
( ) I wouldn't know; I never tried to access SharePoint from outside the schoolhouse.
( ) I was able to get access to SharePoint from outside the schoolhouse when I needed it, but I don't see being able to work from outside the schoolhouse as a big advantage.
( ) Very easy; I had no problem with access and it enabled me to get valuable work done when I otherwise would not have been able to do it.

14. How current or relevant did you feel the core curriculum you developed was to the upcoming job demands of the ILE students?

( ) Not at all relevant
( ) It was no less relevant than one can expect given the rapidly changing operational environment and restrictions on using FOUO content in the classroom
( ) It covered relevant topics, but remember our focus is on education, not mission preparation
( ) It was definitely more relevant than it used to be, but we're not there yet
( ) Totally relevant; Graduates will be able to arrive in their units completely prepared to fulfill the requirements of their duty position

15. When you searched for current information to write curriculum materials, how would you rate the importance of the following resources:

Professional forums in the Battle Command Knowledge System (BCKS) Leader Network

( ) Extremely Important
( ) Somewhat important
( ) Equal Importance
( ) Not too important

( ) Not important at all
( ) Didn't search for current information

Army knowledge repositories (e.g., AKO, CALL, etc.)

( ) Extremely Important
( ) Somewhat important
( ) Equal Importance
( ) Not too important
( ) Not important at all
( ) Didn't search for current information

Non-Army resources (e.g., Google, Early Bird, etc.)

( ) Extremely Important
( ) Somewhat important
( ) Equal Importance
( ) Not too important
( ) Not important at all
( ) Didn't search for current information

Section III - Participation in the Transition Process

16. Did you assist in developing standard operating procedures within your department and/or block for posting and organizing content in SharePoint?

( ) What standard operating procedures? There are none to my knowledge.
( ) I was asked to help with developing standard operating procedures but didn't have time to get involved; I'm not sure if they were ever completed.
( ) I believe we have standard operating procedures, but they came from the tech support people, not the instructors.
( ) I was involved in developing the standard operating procedures, but they don't cover everything and aren't always followed.
( ) I participated fully in the development of standard operating procedures; they are widely available and followed.

17. Do you feel that there are enough faculty to teach ILE, given the additional classes enabled by delivering courseware on the web?

( ) Yes
( ) No

18. Did you participate in formal or informal mentoring among Course Authors on using SharePoint to share curriculum materials (either as a mentor or a "mentee")?

( ) There was no mentoring--formal or informal--among Course Authors.

( ) I believe Course Authors did help each other with SharePoint, but I was never involved.
( ) Sometimes if I needed help, I would ask another Course Author/Sometimes if someone needed help, they would ask me.
( ) Every once in a while, a few of us would have a conversation about how using SharePoint could change the way we teach.
( ) I was regularly involved in helping others leverage SharePoint's capabilities.

19. Which of the following classes did you author for?

February Start
( ) Yes
( ) No

August Start
( ) Yes
( ) No

20. SharePoint is one component of the Fort Leavenworth Lifelong Learning Center (LLC). What is your understanding of what this LLC is?

( ) Never heard of it.
( ) It's a new learning initiative pushed down by higher headquarters.
( ) It's a way to conduct resident and satellite instruction using the same course materials so all majors can get the same core intermediate-level education.
( ) It's an online repository of curriculum materials meant to support anytime/anywhere access to the institution.
( ) It's a networked, collaborative environment designed to link the operating and generating forces through common access to course materials, emerging doctrine, and discussion forums.

21. Did you participate in the decision-making process that led to the requirement to use SharePoint instead of the g drive?

( ) I had no idea they were considering a change; soliciting Course Author input would have been helpful.
( ) I wasn't included in the decision making, but I don't feel I needed to be.
( ) I was made aware that a change was being considered as an alternative to the g drive, but I didn't provide any input to the decision-making process.
( ) Somebody asked me what I felt about using something other than the g: drive, but I'm not sure my input really made a difference one way or the other.
( ) I had full visibility on the decision-making process and felt my input was received and considered.

22. What would you like the CGSC leadership to know about any aspect of the SharePoint System?

This completes the survey.

Again, thank you for participating in this survey. Your time and responses are valued.

APPENDIX B-2
INSTRUCTOR SURVEY

The instructor survey was administered online for 9 days in collaboration with the CGSC Quality Assurance Office. Instructors who taught either the 2006 February-start ILE class or the 2006 August-start class (or both) received an invitation via email to participate in the survey. Sixty-nine of 201 instructors responded to the survey, representing a 34% overall response rate. Of these 69 individuals, 25% ($N = 17$) had taught only for the February-start ILE class, 59% ($N = 41$) had taught only for the August-start ILE class, and 13% had taught both classes ($N = 6$). Two respondents (3%) reported having taught neither class, but had used Blackboard for teaching other components of the CGSOC.

Blackboard, SharePoint and Resident ILE - Instructor Experience

The 2006 February-start and 2006 August-start CGSOC classes are serving as test cases for using Blackboard (instead of the g: drive) as the primary means of distributing curriculum materials. Working within this pilot program, you have probably experienced the inevitable challenges associated with transitioning from one technology to another. Likely, there also have been some unanticipated benefits of the change.

The purpose of this brief, 23-item survey is to capture selected aspects of the instructor experience using Blackboard to deliver the ILE CC curriculum and to conduct classroom education. The survey has 4 parts relating to:

1. Technical Support;
2. Online Course Administration;
3. Classroom Course Administration; and
4. Participation in the Transition Process.

The goal of this survey is to take the "pulse" of the transition effort -- to identify the strengths and weakness of the technical support provided to instructors as well as the actual level of instructor use of Blackboard. The survey also is intended to reveal the level of participation instructors perceive they have had in the process of transitioning from the g: drive to Blackboard.

This survey is completely anonymous and voluntary. Your responses are in no way associated with your name and you may choose, without consequence, not to participate.

As you fill out this survey, consider your experiences in delivering instruction for the 2006 February-start or the 2006 August-start ILE CC. Select the response that best describes your experiences associated with each statement. Also, there are optional open ended questions at the end of each section to add comments.

If you have any questions concerning the content of this survey, contact Dr. Anna Cianciolo, 217-621-3918. If you experience technical difficulties with it, contact Mr. Douglas Loa, 913-684-7275.

This Survey has been approved by QAO and the Survey Control number is 06-078

Section I - Technical Support

1. How accessible did you find the technical support to be?

( ) What tech support? I didn't know there was tech support.
( ) I knew how to find the tech support team, but actually getting a hold of someone was unpredictable; on more than one occasion I had to wait longer than I would have liked.
( ) I wouldn't know; I knew there was a tech support team, but I never tried to contact anybody.
( ) I generally didn't have trouble finding or connecting with someone in tech support; if I ever had to wait, it wasn't a big deal.
( ) Finding and connecting with tech support was no problem at all; I always got somebody when I needed them.

2. How useful did you find the technical support to be?

( ) Not at all useful; I had to find other ways to fix my problems."
( ) They solved technical problems ok, but if the tech support was better, the kinds of problems I had wouldn't exist.
( ) I wouldn't know; I never asked for tech support.
( ) I had a pretty good experience; the system worked well enough and when problems did come up, they were usually fixed the first time around.
( ) They're the best; the system worked great and whenever I needed technical assistance, it was provided quickly, effectively, and professionally.

3. How accessible did you find the Blackboard help documentation to be?

( ) What help documentation? I didn't know there was help documentation.
( ) I think there was supposed to be help documentation, but I sure couldn't find it.
( ) I wouldn't know; I never looked for help documentation.
( ) I could usually find help documentation on the topics I needed to know about.
( ) I could always find the topic I was looking for in the help documentation.

4. How useful did you find the Blackboard help documentation to be?

( ) Not at all useful; I don't even bother looking anymore.
( ) It was ok for the topics it handled, but it usually didn't handle the topics I needed help in.
( ) I wouldn't know; I never used the help documentation.
( ) It generally provided useful information, but I don't think it handled everything.
( ) It always met my information needs.

5. How usable (readable) did you find the Blackboard help documentation to be?

( ) The help documentation was mostly gibberish written by someone who knows the system but not how to write.
( ) It was ok; I usually had to read it a couple of times over to get what it was saying, but eventually I understood it.
( ) I wouldn't know; I never used the help documentation.
( ) I usually didn't have trouble understanding the help documentation, but I'm used to reading technical writing.
( ) The help documentation was easy to understand; even my grandmother would get it!

6. Have you participated in Blackboard instruction?

( ) Yes
( ) No - I already know how to use Blackboard
( ) No - I didn't know there was Blackboard instruction
( ) No - I didn't have time

6a. Did you have to re-learn anything you were taught in order to perform instructional tasks?

( ) Yes
( ) No

Additional Comments regarding the Technical Support (optional):

Section II - Online Course Administration

7. How knowledgeable do you feel _____ are with using Blackboard?

your students

( ) Very knowledgeable
( ) Knowledgeable
( ) Somewhat knowledgeable
( ) Very little
( ) Not at all

you

( ) Very knowledgeable
( ) Knowledgeable
( ) Somewhat knowledgeable
( ) Very little
( ) Not at all

8. When you distributed supplemental curriculum materials, what means did you use most often?

( ) Blackboard
( ) SharePoint
( ) g: drive
( ) Distributed via email
( ) Distributed via memory stick/thumb drive
( ) Printed materials
( ) Other (e.g., AKO personal webpage) [ ]

9. How easy was it to post supplemental curriculum materials in Blackboard?

( ) It was very difficult; I mostly used other means to share resources with my students.
( ) Let's just say it wasn't the g drive; it limited my options for sharing information with the people who I felt needed it.
( ) No idea; I never posted in Blackboard.
( ) Fairly easy, but the g: drive is more flexible.
( ) Piece of cake; I had no problems at all.

10. How frequently did you supplement the core curriculum materials based on current events (for example, by distributing a relevant news story or emerging doctrine)?

( ) Daily
( ) Weekly
( ) Every couple of weeks
( ) Monthly
( ) Never

11. How frequently did you supplement the core curriculum materials relative to past ILE courses when you used the g: drive for posting course content?

( ) A lot more frequently
( ) Somewhat more frequently
( ) Pretty much the same
( ) Somewhat less frequently
( ) A lot less frequently
( ) N/A - I don't supplement curriculum materials
( ) N/A - This is my first time teaching the course

12. Which of the following administrative tasks did you use Blackboard to conduct (check all that apply)?

( ) Making announcements (e.g., for changes to readings)
( ) Delivering handouts (e.g., supplemental read-aheads)
( ) Coordinating class activity or group projects
( ) Administering (multiple-choice) exams
( ) Receiving course products (e.g., term papers, presentations, etc.)

( ) Recording grades
( ) None of the above

13. When you searched for current information to supplement the curriculum materials, how often did you use:

Professional forums in the Battle Command Knowledge System (BCKS) Leader Network

( ) Daily
( ) Weekly
( ) Every couple of weeks
( ) Monthly
( ) Never
( ) Didn't search for supplemental information

Army knowledge repositories (e.g., AKO, CALL, etc.)

( ) Daily
( ) Weekly
( ) Every couple of weeks
( ) Monthly
( ) Never
( ) Didn't search for supplemental information

Non-Army resources (e.g., Google, Early Bird, etc.)

( ) Daily
( ) Weekly
( ) Every couple of weeks
( ) Monthly
( ) Never
( ) Didn't search for supplemental information

Additional Comments regarding the Online Course Administration (optional)

Section III - Course Administration

14. The Blackboard Learning System enhances your students ILE education.

( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

15. How much would you estimate that doing administrative tasks in Blackboard reduced the time you had to spend on administration in class?

( ) I actually had to spend more class time on admin because students often had problems with the system.
( ) No real reduction in in-class admin time.
( ) Some reduction in in-class admin time; probably there will be a greater reduction when I learn more about how to use the system.
( ) Reduced the time to zero; I did not have to do admin tasks in class, so we devoted class time entirely to learning.

16. How current or relevant did you feel the core curriculum (with supplements) was to the upcoming job demands of your students?

( ) Not at all relevant
( ) It was no less relevant than one can expect given the rapidly changing operational environment and restrictions on using FOUO content in the classroom
( ) It covered relevant topics, but remember our focus is on education, not mission preparation
( ) It was definitely more relevant than it used to be, but we're not there yet
( ) Totally relevant; Graduates will be able to arrive in their units completely prepared to fulfill the requirements of their duty position

Additional Comments regarding the Course Administration (optional):

Section IV - Participation in the Transition Process

17. Did you assist in developing standard operating procedures within your teaching team/section for posting, organizing, and sharing (e.g., across staff groups) content in Blackboard?

( ) What standard operating procedures? There are none to my knowledge.
( ) I was asked to help with developing standard operating procedures but didn't have time to get involved; I'm not sure if they were ever completed.
( ) I believe we have standard operating procedures, but they came from the tech support people, not the instructors.
( ) I was involved in developing the standard operating procedures, but they don't cover everything and aren't always followed.
( ) I participated fully in the development of standard operating procedures; they are widely available and followed.

18. Do you feel that there are enough faculty to teach ILE, given the additional classes enabled by delivering courseware on the web?

( ) Yes
( ) No

19. Did you participate in formal or informal mentoring among instructors on using Blackboard for instruction (either as a mentor or a "mentee")?

( ) There was no mentoring--formal or informal--among instructors.
( ) I believe instructors did help each other with Blackboard, but I was never involved.
( ) Sometimes if I needed help, I would ask another instructor/Sometimes if someone needed help, they would ask me.
( ) Every once in a while, a few of us would have a conversation about how using Blackboard could change the way we teach.
( ) I was regularly involved in helping others leverage Blackboard's capabilities.

20. Which of the following classes did you teach in?

February Start
( ) Yes
( ) No

August Start

( ) Yes
( ) No

21. Blackboard is one component of the Fort Leavenworth Lifelong Learning Center (LLC). What is your understanding of what this LLC is?

( ) Never heard of it.
( ) It's a new learning initiative pushed down by higher headquarters.
( ) It's a way to conduct resident and satellite instruction using the same course materials so all majors can get the same core intermediate-level education.
( ) It's an online repository of curriculum materials meant to support anytime/anywhere access to the institution.
( ) It's a networked, collaborative environment designed to link the operating and generating forces through common access to course materials, emerging doctrine, and discussion forums.

22. Did you participate in the decision-making process that led to the requirement to use Blackboard instead of the g drive?

( ) I had no idea they were considering a change; soliciting instructor input would have been helpful.
( ) I wasn't included in the decision making, but I don't feel I needed to be.
( ) I was made aware that a change was being considered as an alternative to the g drive, but I didn't provide any input to the decision-making process.
( ) Somebody asked me what I felt about using something other than the g: drive, but I'm not sure my input really made a difference one way or the other.
( ) I had full visibility on the decision-making process and felt my input was received and considered.

23. What would you like the CGSC leadership to know about any aspect of the Blackboard System?

This completes the survey.

Again, thank you for participating in this survey. Your time and responses are valued.

APPENDIX B-3
STUDENT SURVEY

The student survey was administered online for approximately three weeks in collaboration with the CGSC Quality Assurance Office. Students in the 2006 February-start ILE class and the 2006 August-start class received an invitation via email to participate in the survey. Two-hundred fifty-one students responded to the survey, representing a 30% overall response rate. A complete reproduction of the survey is shown below.

Blackboard, SharePoint and Resident ILE - Student Experience

Your resident CGSOC ILE class is among the first to use Blackboard as the primary means of distributing curriculum materials and SharePoint as the primary means of course administration. As students during this pilot, you have probably experienced the inevitable challenges associated with transitioning from one technology to another. Likely, there also have been some unanticipated benefits of the change. The purpose of this brief, 22-item survey is to capture selected aspects of the ILE CC student experience relating to:

1. Course content;
2. Course Administration; and
3. The Overall Learning Experience.

The goal of this survey is to take the "pulse" of the pilot effort -- to identify how Blackboard and SharePoint are used by students and to understand the impact of these technologies on course effectiveness and learning.

This survey is completely anonymous and voluntary. Your responses are in no way associated with your name and you may choose, without consequence, not to participate.

As you fill out this survey, consider your experiences during ILE CC. Select the response that best describes your experiences associated with each statement. There is an open ended comment box at the end of the each section; please feel free to add comments.

If you have any questions concerning the content of this survey, contact Dr. Anna Cianciolo, 217-621-3918. If you experience technical difficulties with it, contact Mr. Douglas Loa, 913-684-7275.

This Survey has been approved by QAO and the Survey Control number is 06-077

Blackboard, SharePoint, and Resident Intermediate-Level Education (ILE):
A Survey of the Student Experience

Section I - Course Content

1. How relevant was the common core curriculum to the job you expect to have after you graduate?

( ) Not at all relevant.
( ) More irrelevant than relevant; some topics addressed my needs and interests, but I won't be able to apply directly what I learned.
( ) No less relevant than any other academic experience; school learning is supposed to be "just in case" not "just in time."
( ) More relevant than irrelevant; topics generally addressed my needs and interests, and with some effort I should be able to apply what I learned.
( ) Totally relevant; I will be fully prepared for my next job.

2. How relevant were the supplemental materials (e.g., readings, video interviews, etc.) your instructors provided to the job you expect to have after you graduate?

( ) Not at all relevant; they just didn't cover topics of interest to me.
( ) More irrelevant than relevant; they covered relevant topics but at too abstract a level to be useful.
( ) No less relevant than one can expect in the academic environment and with restrictions on FOUO content sharing.
( ) More relevant than irrelevant; there were some really useful resources, but I could have used more of them.
( ) Totally relevant; I know I'll want to reach back from the field to ILE courses further down the road so I can stay current.

3. Did any of your instructors encourage you to contribute content to the course materials?

( ) No; nobody asked for student input. It was assumed that instructors do the teaching, and students do the learning.
( ) Sort of; more often than not, instructors did not ask for input, but we were encouraged to contribute if we offered.
( ) Yes; instructors generally recognized students' specific areas of expertise and actively found ways to fold our input into readings and/or classroom discussion.

4. Did any of your instructors encourage you (or demonstrate how) to find resources in addition to him or herself to learn more about a topic discussed in class?

( ) No; instructors generally saw themselves as the leading authority on the topic they were teaching.
( ) Sort of; instructors didn't discourage independent research, but it also wasn't important for doing well in class.

( ) Yes; instructors actively encouraged us to do our own research by using professional forums, AKO, CALL, or other resources, and showed people where to find things if they didn't already know.

5. When you searched for current information to complete class assignments or to conduct independent research, how would you rate the importance of the following resources:

Professional forums in the Battle Command Knowledge System (BCKS) Leader Network

( ) Extremely important - This was the only type of resource I used
( ) Somewhat important - I used this type of resource more than others
( ) Equal importance - I used this type of resource as much as I did the others
( ) Not too important - I used other types of resources more than this one
( ) Not at all important - I never used this type of resource
( ) Didn't search for current information

Army knowledge repositories (e.g., AKO, CALL, etc.)

( ) Extremely important - This was the only type of resource I used
( ) Somewhat important - I used this type of resource more than others
( ) Equal importance - I used this type of resource as much as I did the others
( ) Not too important - I used other types of resources more than this one
( ) Not at all important - I never used this type of resource
( ) Didn't search for current information

Non-Army resources (e.g., Google, Early Bird, etc.)

( ) Extremely important - This was the only type of resource I used
( ) Somewhat important - I used this type of resource more than others
( ) Equal importance - I used this type of resource as much as I did the others
( ) Not too important - I used other types of resources more than this one
( ) Not at all important - I never used this type of resource
( ) Didn't search for current information

Additional Comments regarding the Course Content (optional):

Section II - Course Administration

6. What was the primary means you used to access course materials?

( ) Blackboard
( ) SharePoint
( ) g: drive
( ) Email
( ) Memory stick/thumb drive
( ) Printed documents from the instructor
( ) Other [ ]

7. What was the primary means you used to coordinate with other students?

( ) Blackboard
( ) SharePoint
( ) Email
( ) Phone
( ) Face-to-face meetings
( ) Other [ ]

8. How often did you access Blackboard prior to a class meeting in order to prepare by reading or reviewing lecture materials ahead of time?

( ) Never; our class content wasn't posted in Blackboard/there was always a better way than Blackboard to get to course content.
( ) Sometimes; if the course content was actually on Blackboard and I had the time.
( ) Often; course content was usually on Blackboard and I tried to make time to get to it before class.
( ) Always; I could count on content being on Blackboard and actively used access to it to prepare.
( ) N/A; I didn't prepare for class by reading ahead or reviewing lecture materials.

9. Was there someone among the students in your staff group who used SharePoint to coordinate student efforts (e.g., group assignments, due date lists, class calendar, etc.)?

( ) No; we all pretty much fended for ourselves when trying to succeed in class.
( ) No; we had a student leader, but he/she didn't use SharePoint to coordinate our efforts.
( ) Yes; we had a staff group student leader appointed by the instructor to help out.
( ) Yes; a staff group student leader emerged within the first few weeks of class.

How difficult was it to access _____ from outside the schoolhouse?

10. Blackboard
( ) Extremely difficult; I stopped trying altogether.
( ) Somewhat difficult; I only did it when I absolutely had to.
( ) I wouldn't know; I didn't try to access it from outside the schoolhouse.
( ) Not too difficult; I had no more difficulty with accessing this than one would expect
( ) Extremely easy; I never had any problem accessing this from outside the schoolhouse

11. SharePoint
( ) Extremely difficult; I stopped trying altogether.
( ) Somewhat difficult; I only did it when I absolutely had to.
( ) I wouldn't know; I didn't try to access it from outside the schoolhouse.
( ) Not too difficult; I had no more difficulty with accessing this than one would expect
( ) Extremely easy; I never had any problem accessing this from outside the schoolhouse

What would you do to make the system easier to access?

12. How often did your common core instructors do the following:

Provide clear guidance regarding their expectations and performance evaluation criteria?

( ) Every instructor did this
( ) More instructors did this than didn't do this
( ) About as many instructors did this as didn't do this
( ) Fewer instructors did this than didn't do this
( ) No instructor did this

Provide constructive and informative feedback on your performance?

( ) Every instructor did this
( ) More instructors did this than didn't do this
( ) About as many instructors did this as didn't do this
( ) Fewer instructors did this than didn't do this
( ) No instructor did this

Present learning challenges that were difficult but not overwhelming?

( ) Every instructor did this
( ) More instructors did this than didn't do this
( ) About as many instructors did this as didn't do this
( ) Fewer instructors did this than didn't do this
( ) No instructor did this

Assign group tasks that had well-defined tasks and roles for each group member?

( ) Every instructor did this
( ) More instructors did this than didn't do this
( ) About as many instructors did this as didn't do this
( ) Fewer instructors did this than didn't do this
( ) No instructor did this

Engage students in asking questions and reflecting on class materials?

( ) Every instructor did this
( ) More instructors did this than didn't do this
( ) About as many instructors did this as didn't do this
( ) Fewer instructors did this than didn't do this
( ) No instructor did this

13. During the common core course, how successful did you feel in leading your own learning process?

( ) Fully capable; I had all of the tools and access I needed to accomplish my learning goals.
( ) Somewhat capable; I felt I was successful in reaching many of my learning goals, but I sometimes lacked the time to accomplish everything I wanted to.
( ) Not sure; I was never really given the chance to lead my own learning.
( ) Not very capable; I don't feel I had the kind of access to learning resources that I needed to succeed.
( ) Not at all capable; I spent so much time just trying to figure out Blackboard and SharePoint, that I had little opportunity to take charge.
( ) N/A; I don't feel students should lead their own learning - that's why they have instructors.

14. How accessible did you find the technical support to be?

( ) What tech support? I didn't know there was tech support.
( ) I knew how to find the tech support team, but actually getting a hold of someone was unpredictable; on more than one occasion I had to wait longer than I would have liked.
( ) I wouldn't know; I knew there was a tech support team, but I never tried to contact anybody.
( ) I generally didn't have trouble finding or connecting with someone in tech support; if I ever had to wait, it wasn't a big deal.
( ) Finding and connecting with tech support was no problem at all; I always got somebody when I needed them.

15. How useful did you find the technical support to be?

( ) Not at all useful; I had to find other ways to fix my problems."
( ) They solved technical problems ok, but if the tech support was better, the kinds of problems I had wouldn't exist.
( ) I wouldn't know; I never asked for tech support.
( ) I had a pretty good experience; the system worked well enough and when problems did come up, they were usually fixed the first time around.
( ) They're the best; the system worked great and whenever I needed technical assistance, it was provided quickly, effectively, and professionally.

Additional Comments regarding the Course Administration (optional):

Section III - Overall Learning Experience

16. How motivated did you feel to learn the subjects in the common core course?

( ) Highly motivated; the course content spoke to my interests and/or the instructors were engaging.
( ) Generally motivated; more often than not, the course content spoke to my interests and/or the instructors were engaging.
( ) Generally not motivated; the course content usually did not speak to my interests and/or the instructors were not engaging.
( ) Barely motivated; the course content was irrelevant and/or instructors seemed poorly qualified or burned out.

17. What do you think is the primary reason that ILE courses are being administered via Blackboard and SharePoint?

( ) The Army wants to save money.
( ) The Army leadership likes Blackboard and SharePoint and decided everyone has to use it.
( ) The Army thinks using Blackboard and SharePoint is in the best interests of leader education.
( ) I couldn't say how the decision to use Blackboard and SharePoint was made.
( ) Other [ ]

18. The instruction I've received on Blackboard supports my use of Blackboard in ILE, so far.

( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

19. When I use Blackboard, connecting to the internet has not been a recurring problem.

( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

20. The Blackboard Learning System will enhance my ILE education.

( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

21. My ILE instructors are knowledgeable on the Blackboard Learning System.
{Choose one}
( ) Strongly Agree
( ) Agree
( ) Undecided
( ) Disagree
( ) Strongly Disagree

22. What would you like the CGSC leadership to know about any aspect of the Blackboard or SharePoint System(s)?

The following questions are strictly for demographic information only.

23. What CGSC Class are you in?

( ) AY 007-001
( ) AY 006-002
( ) AY 006-002 (Pilot)

24. My CGSS Section is

( ) 1
( ) 2
( ) 3 (PILOT)
( ) 4
( ) 5
( ) 7
( ) 8
( ) 9
( ) 10
( ) 11
( ) 12
( ) 13
( ) 15
( ) 16
( ) 18
( ) 19
( ) 20

Staff Group
( ) A
( ) B
( ) C
( ) D

This completes the survey.

If you would like more information regarding the Lifelong Learning Center, copy and paste the link below into the address bar on the next page.

http://www.tradoc.army.mil/pao/Web_specials/lifelong_learning/intro.htm

Again, thank you for participating in this survey. Your time and responses are valued.

APPENDIX C
ACRONYMS

AKO	Army Knowledge Online
BCKS	Battle Command Knowledge System
CBT	computer-based training
CGSC	Command and General Staff College
CGSOC	Command and General Staff Officers' Course
CGSS	Command and General Staff School
DA	Department of the Army
DMOSQ	Duty military occupational specialty qualified
DOET	Directorate of Educational Technology
FSDO	Faculty and Staff Development Office
ILE	Intermediate-Level Education
KM	knowledge management
LLC	Lifelong Learning Center
LVN LLI	Leavenworth Lifelong Learning Initiative
METL	Mission essential task list
MOSQ	Military occupational specialty qualified
QAO	Quality Assurance Office
SADL	School of Advanced Distance Learning
SOP	Standard Operating Procedure
TASS	Total Army School System
TRADOC	U.S. Army Training & Doctrine Command
WBT	Web-based training